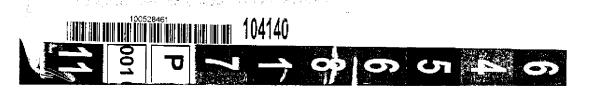
orking File Folder - NSR Permit

npany Name: Surlington Resources

inty: Live Oak Cul x fas

company

count: n/a Permit No:
106456817 Filing Date:







Bryan W. Shaw, Ph.D., Chairman Carlos Rubinstein, Commissioner Toby Baker, Commissioner Zak Covar, Executive Director



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

December 13, 2012

MR RANDY BLACK MANAGER OF PRODUCTION OPERATIONS - GCBU BURLINGTON RESOURCES OIL AND GAS COMPANY LP 600 N DAIRY ASHFORD WESTLAKE 3 STE 15012 HOUSTON TX 77079-

RECEIVED

JAN 1 5 2013

CENTRAL FILE ROOM

Permit by Rule Registration Number:

Location/City/County:

104140

From the intx of US 281 and FM 99 head NE on FM 99 for 4.9 mi turn L to stay on FM 99 and head N for 2.8 mi turn R onto CR 271 and head E 1.66 mi enter lease

rd on R and turn L continue 1.2 mi turn R for 1.5 mi site at end of lease rd, Whitsett, Live Oak County

Project Description/Unit:

Regulated Entity Number:

Customer Reference Number:

New or Existing Site:

Jo Ann Esse Unit F1

RN106456817 CN602989436

New

Burlington Resources Oil & Gas Company LP has certified the emissions associated with the Jo Ann Esse Unit F1 under Title 30 Texas Administrative Code §§ 106.352 (1)(effective 2/27/2011), 106.492 (effective 9/4/2000). The TCEQ Air Permits Division recommends that Burlington perform site-specific analysis including H2S concentration and recalculate emissions (if needed) to confirm that site-wide emissions do not exceed the certified limits, within six months from start of operation or from the date this letter is issued whichever is later. Emissions are listed on the attached table. For rule information see www.tceq.texas.gov/permitting/air/nav/standard.html.

Planned MSS emissions for flare downtime and downstream compressor maintenance have been reviewed. These authorized MSS emissions are included on the emissions table. No other planned MSS emissions have been represented or reviewed. The company is also reminded that these facilities may be subject to and must comply with other state and federal air quality requirements. In addition, under the General Requirements for all Permit by Rules, § 106.2 states that particular requirements only apply "where construction is commenced on or after the effective date of the relevant permit by rule."

This certification is taken under the authority delegated by the Executive Director of the TCEQ. If you have questions, please contact Ms. Dana Johnson at (512) 239-2022. Sincerely.

Anne M. Inman, P.E., Manager **Rule Registrations Section**

Air Permits Division

cc: Air Section Manager, Region 14 - Corpus Christi

Project Number: 179758

Emission Sources - Certified Emission Rates

Registration Number 104140

This table lists the certified emission rates and all sources of air contaminants on the applicant's property covered by this registration. The emission rates shown are those derived from information submitted as part of the registration for PBR.

ESTIMATED EMISSIONS	distribution and the second											100	d and a second
EPN / Emission Source	VOC	ט	. NO _x	,x	CO :		PM1082.5	&2.5	SO ₂)2	нсно	H	H ₂ S
	lbs/hr tpy		lbs/hr	tpy	lbs/hr	tpy	$ \mathbf{bs/hr} $	tpy	lbs/hr	tpy	lbs/hr tpy	lbs/hr tpy	tpy
Normal Operations													
FUG / Site Fugitives	0.40	1.74										<0.01	<0.01
TK-01 - 03 / Condensate Tanks	2.62	4.24										<0.01	<0.01
TK-04 / Produced Water Tank	0.02	0.02										<0.01	<0.01
TRUCK1 / Condensate Truck Loading	1.58	0.58											
TRUCK2 / Produced Water Truck Loading	0.02	<0.01											
FL-1 / Flare	0.03	90.0	1.08	2.07	2.15	4.16	<0.01	<0.01	90.0	0.25		<0.01	<0.01
Scheduled Maintenance, Startup and Shutdown Event	ap and S	hutdo	wn Ever	ıt									
SEP-GAS / Low Pressure Separator Gas to Flare	23.38	6.14										0.03	0.01
FL-1 / Flare Combustion (LP separator waste gas)	0.34	60.0	11.46	3.01	22.89	6.01	<0.01	<0.01	2.71	0.90		0.03	0.01
TK-01 - 03 / Condensate Tank Standing Loss (during flare downtime)	1.73	0.15										_	
TK-04 / Produced Water Tank Standing Loss (during flare downtime)	<0.01	<0.01											
TOTAL EMISSIONS (TPY):		13.02		5.08		10.17		<0.01		1.15		-	0.02
MAXIMUM OPERATING SCHEDULE:		Hours	rs/Day		Days/	Days/Week		Week	Weeks/Year		Hours/Year	4.	8,760

TECHNICAL REVIEW: AIR PERMIT BY RULE

Permit No.: 104140	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Dana Johnson
Project No.: 179758	Unit Name:	Jo Ann Esse Unit F1		106.352 (l)(effective 2/27/2000) and 106.492 (effective 9/4/2000)

GENERAL INFORMATION	elt over end over the state of the state of	and the second of the many of the	
Regulated Entity No.:	RN106456817	Project Type:	Permit by Rule Application
Customer Reference No.:	CN602989436	Date Received by TCEQ:	July 6, 2012
Account No.:	None assigned	Date Received by Reviewer:	November 29, 2012
City/County:	Whitsett, Live Oak County	Physical Location:	From the intx of US 281 and FM 99 head NE on FM 99 for 4.9 mi turn L to stay on FM 99 and head N for 2.8 mi turn R onto CR 271 and head E 1.66 mi enter lease rd on R and turn L continue 1.2 mi turn R for 1.5 mi site at end of lease rd

CONTACT INFORMATION		100			and place of the second
Responsible Official/ Primary Contact Name and Title:	Mr. Randy Black Manager Of Production Operations - GCBU	Phone No.: Fax No.:	(832) 486-6508 (832) 486-6431	Email:	RANDY.C.BLACK@CON OCOPHILLIPS.COM
Technical Contact/ Consultant Name and Title:	Mr. James Woodall Sr. Environmental Specialist	Phone No.: Fax No.:	(832) 486-6508 (832) 486-6431	Email:	JAMES.WOODALL@CO NOCOPHILLIPS.COM

GENERAL RULES CHECK	YES	NO	COMMENTS
Is confidential information included in the application?		X	
Are there affected NSR or Title V permits for the project?		X	
Is each PBR > 25/250 tpy?		X	
Are PBR sitewide emissions > 25/250 tpy?		X	
Are there permit limits on using PBRs at the site?		Х	
Is PSD or Nonattainment netting required?		X	
Do NSPS, NESHAP, or MACT standards apply to this registration?		Х	
Does NOx Cap and Trade apply to this registration?		Х	
Is the facility in compliance with all other applicable rules and regulations?	x		
Is Registration Certified?	X		
Does the site handle sour oil or gas?	X		Distance to receptor if Sour: > 4,700 feet
Did the company use a Simulator program (such as ProMax?)	X		
Is planned MSS included in the registration?		Х	

DESCRIBE OVERALL PROCESS AT THE SITE

This Permit by Rule (PBR) registration is being submitted to authorize three (3) condensate storage tanks and associated loading, one (1) produced water storage tank and associated loading, one (1) flare combustion control device, and piping and fugitive components (the Project) at the Site. Figure 1-1 is an area map showing the location of the Site and the surrounding area. Figure 1-2 is a process flow diagram for the Site.

TECHNICAL REVIEW: AIR PERMIT BY RULE

Permit No.:	104140	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Dana Johnson
Project No.:	179758	Unit Name:	Jo Ann Esse Unit F1		106.352 (l)(effective 2/27/2000) and 106.492 (effective 9/4/2000)

DESCRIBE PROJECT AND INVOLVED PROCESS

Normal Operations

The Site has a single well which will produce high pressure gas and liquids (condensate and water). The mixture extracted from the well will first pass through a high pressure separator where the high pressure gas will be collected and sent to pipeline. Liquids from the HP separator will then pass to a low pressure separator. Low pressure gas off of the LP separator will go to sales as well, via a low pressure pipeline.

Pressurized liquids from the low pressure separator will be divided into both produced water and condensate streams. Condensate is routed to the condensate storage tanks (FINs [Facility Identification Number] TK-01, TK-02 and TK-03) and water is routed to the produced water tank (FIN TK-04). The emissions associated with the flash from the pressure change as well as the working/breathing emissions from all tanks are routed to a flare (FIN FL-1) and are captured and controlled at a 98% efficiency. As demonstrated in the calculations, assist gas is sent to the flare to ensure that the waste gas stream can sustain combustion.

The condensate and produced water tanks are loaded out periodically (FINs TRUCK1 and TRUCK2), emissions from which are also controlled by the flare (FIN FL-1). The Site will also emit emissions due to equipment component leaks (FIN FUG).

Scheduled Maintenance Startup and Shutdown Events

In accordance with TCEQ guidance and 30 Texas Administrative Code (TAC) §106.352, a representation of planned Maintenance, Startup and Shutdown events are included in this PBR registration in addition to the normal operating scenario.

It is conservatively planned that the flare will be down for maintenance 2% of the year. During this time the well would be shut in and therefore gas and liquids would not be producing, but any liquids previously in storage tanks (FINs TK-01, TK-02, TK-03, and TK-04) would have standing losses emitted to atmosphere.

Additionally, during engine maintenance events at downstream sites the low pressure separator gas (FIN SEP-GAS) is sent to the flare (FIN FL-I) for combustion. This scenario is conservatively predicted to occur 6% of the year.

TECHNICAL REVIEW: AIR PERMIT BY RULE

Permit No.:	104140	Company Name:	Burlington Resources Oil & Gas Company LP	APD Reviewer:	Ms. Dana Johnson
Project No.:	179758	Unit Name:	Jo Ann Esse Unit F1		106.352 (l)(effective 2/27/2000) and 106.492 (effective 9/4/2000)

ESTIMATED EMISSIONS														
EPN / Emission Source	ve	c	NO) <u>.</u>	CC		PM ₁	o&2.5	SO	2	HCI	ю	H2	S
	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
Normal Operations														
FUG / Site Fugitives	0.40	1.74											<0.01	<0.01
TK-01 - 03 / Condensate Tanks	2.62	4.24											<0.01	<0.01
TK-04 / Produced Water Tank	0.02	0.02											<0.01	<0.01
TRUCK1 / Condensate Truck Loading	1.58	0.58												
TRUCK2 / Produced Water Truck Loading	0.02	<0.01												
FL-1 / Flare	0.03	0.06	1.08	2.07	2.15	4.16	<0.01	<0.01	0.06	0.25			<0.01	<0.01
Scheduled Maintenance, Startu	p and Sl	ıutdow	n Event											
SEP-GAS / Low Pressure Separator Gas to Flare	23.38	6.14											0.03	0.01
FL-1 / Flare Combustion (LP separator waste gas)	0.34	0.09	11.46	3.01	22.89	6.01	<0.01	<0.01	2.71	0.90			0.03	0.01
TK-01 - 03 / Condensate Tank Standing Loss (during flare downtime)	1.73	0.15									· .			
TK-04 / Produced Water Tank Standing Loss (during flare downtime)	<0.01	<0.01												
TOTAL EMISSIONS (TPY):		13.02		5.08		10.17		<0.01		1.15				0.02
MAXIMUM OPERATING SCHEDULE:	•	Ho	urs/Day		Days	/Week		Wee	ks/Year		Hour	s/Year		8,760

military to	TECHNICAL REVIEWER	PEER REVIEWER	FINAL REVIEWER
SIGNATURE:	Debata.	A RAN	See Hard Copy.
PRINTED NAME:	Ms. Sally Bittick	Mr. Vincent Rehkopf	Ms. Anne M. Inman, P.E., Manager
DATE:	December 13, 2012	December 13, 2012	December 13, 2012

Company N				cking/Rout	Q2 Date: November 28, 2012		
Permit No.	: 104140				Project No.: 179758		
			1			100	
Station #	Action/Task Description	RVR	Peer	Station #	Action/Task Description	RVR	Peer
	Application Scanned file saved in J:\	_			Update TRV	76	
0	me saved m3:\	les -			Opdate TRV	SK	-
					complete Emissions table from file info		
	Authorization Letter merged	SB		4	Add reviewer name to TRV		
	confirm Proj Name, Permit #	1			Remove all highlights & notes from TRV		
	clean-up location directions	1		1	file saved in J:\	-	-
	confirm if MSS associated	1			The saved in b. (-	-
	file saved in J:\			*	Proofing	933	va
1	Technical Summary Review merged	1			TRV - Confirm all text in TRV readable	1	
	confirm Proj Name, Permit #			5	check name, #, site, proj descr		
	confirm contact info	1			Sign peer reviewer on TRV		1
	determine if sweet/sour + dist	-	-		Letter - Confirm all text in TRV readable	+	H-
	determine federal applicability				check name, #, site, proj descr	1	V
-	file saved in J:\		1 1 1 1 1 1		Final Package	~	
2	Update TRV from pdf file				IMS update tracking elements	4	
_	Site/Plant description	1	1		check name, #, site, proj descr		
	Project description	1/		6	update attributes		
1			1000	1	Print Mikey (2 copies)		
	file saved in J:\			1	Print Letter (2 copies)	V21	
	Technical Review				Print TRV (2 copies)	*	
	confirm unit description to calc inputs			F15-11		200	100
	Storage tanks			7	To Anne for signature	VIL	
	Truck Loading						
	Engines				TRV profiled		
	Flares or Combustor			8	LTR profiled		
	Other units:				Application profiled	1	
3	compare calculation results to		-		Application profiled	70	
	emissions summary			le English			
	fugitives			Page No.	Issue		
	Storage tanks			g,.			
	Truck Loading		İ				
	Engines						
	Flares or Combustor						
	Trafes of Compusion						_

07/09/2012 -----NSR IMS - PROJECT RECORD ------

PROJECT#: 179758

PERMIT#: 104140

STATUS: PENDING

RECEIVED: 07/06/2012 PROJTYPE: INITIAL

AUTHTYPE: PBR

DISP CODE: ISSUED DT:

RENEWAL:

PROJECT ADMIN NAME: JO ANN ESSE UNIT F1 PROJECT TECH NAME: JO ANN ESSE UNIT F1

Assigned Team: RULE REG SECTION

4,700 feet 4,700 feet 4/25 200 pm

STAFF ASSIGNED TO PROJECT:

YOUNG, SANDRA

- REVIEWR1 2-

AP INITIAL REVIEW

TEAM LEADER, RR

- REVIEW ENG -

RULE REG SECTION

CUSTOMER INFORMATION (OWNER/OPERATOR DATA)

ISSUED TO: BURLINGTON RESOURCES OIL & GAS COMPANY LP COMPANY NAME: Burlington Resources Oil & Gas Company LP

CUSTOMER REFERENCE NUMBER: CN602989436

REGULATED ENTITY/SITE INFORMATION

REGULATED ENTITY NUMBER: RN106456817

ACCOUNT:

PERMIT NAME: JO ANN ESSE UNIT F1

REGULATED ENTITY LOCATION: FROM THE INTX OF US 281 AND FM 99 HEAD NE ON FM 99 FOR 4.9 MI TURN L TO STAY ON FM 99 AND HEAD N FOR 2.8 MI TURN R ONTO CR 271 AND HEAD E 1.66 MI ENTER LEASE RD ON R AND TURN L CONTINUE 1.2 MI AND TURN R FOR 1.5 MI SITE AT END OF LEASE RD

REGION 14 - CORPUS CHRISTI

NEAR CITY: WHITSETT

COUNTY: LIVE OAK

CONTACT DATA

CONTACT NAME: MR RANDY BLACK

CONTACT ROLE: RESPONSIBLE OFFICIAL

JOB TITLE: MANAGER OF PRODUCTION

ORGANIZATION: BURLINGTON RESOURCES OIL AND

OPERATIONS - GCBU GAS COMPANY LP

MAILING ADDRESS: 600 N DAIRY ASHFORD WESTLAKE 3 STE 15012, HOUSTON, TX, 77079-

PHONE: (832) 486-6508 Ext: 0 FAX: (832) 486-6431 Ext: 0

EMAIL:RANDY.C.BLACK@CONOCOPHILLIPS.COM

CONTACT NAME: MR JAMES WOODALL

CONTACT ROLE: TECHNICAL CONTACT

JOB TITLE: SR ENVIRONMENTAL **SPECIALIST**

ORGANIZATION: BURLINGTON RESOURCES OIL & GAS

COMPANY LP

MAILING ADDRESS: 600 N DAIRY ASHFORD WESTLAKE 3 STE 15012, HOUSTON, TX, 77079-

PHONE: (832) 486-6508 Ext: 0

FAX: (832) 486-6431 Ext: 0

			ə	End Dat	Start Date	Rule Desc	Unit Desc
						:\$3	PERMIT RULE
APPROVE	Х	ΔQA		- 264.301			FLARES
APPROVE	٨	ααΑ	5011-FEB-	106.352.2 27 -	NO	S PRODUCTIC	OIL AND GA FACILITIES
Approve	On Application	ype equest		Kule Des		res:	PROJECT RU Unit Desc
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				(BTAG) DE	W COMPLETE	AITIAL REVIE	ENCINEES I
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	əqvT İnər	CHECK	Fee Receipt Dat	fmount 150.00		Fee Receipt	S4823 Keterence LEE :

РВОЈЕСТ АТТВІВИТЕЗ:

Attributes Value

PROJECT POINT

ATTACHMENT 3 EMISSION RATE CALCULATIONS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

FL-1 TK-01 TK-02 TK-03 FL-I FL-I F F F FL-1 Normal Operations FUG EPN FUG TK-01 TK-02 TK-03 TK-04 TRUCK1 TRUCK2 FL-1 TK-01 TK-02 TK-03 nance, Startup and Shutdown Events
SEP-GAS
Low Pressure FL-1 FIZ Uncontrolled PW Tank Standing Loss Emissions Uncontrolled Condensate Tank Standing Loss Flare Combustion (lp separator waste gas) Flare Combustion (normal operations waste gas, assist, and pilot) Controlled PW Tank Emissions Controlled Condensate Truck Loading Controlled Produced Water Truck Loading Emissions (during flare downtime) Low Pressure Separator Gas to Flare Controlled Condensate Tank Emissions Site Fugitives (during flare downtime) Description Site-Wide Emissions: 22.89 (lb/hr) ł : : : co 10.17 4.16 6.01 1 1 1 ì (T/yr) 5.08 3.01 2.07 Proposed Allowable Hourly and Annual Emission Rates PM/PM₁₀/PM_{2.5} SO₂ (lh/hr) : : (1/yr) 0.00 (lh/hr) 2.71 (T/yr) 1.15 0.90 1 1 (lb/hr) 23.38 0.02 0.34 0.03 0.02 0.40 1.73 2.62 0.0003 (I/yr) 6.14 0.09 0.02 13.02 0.15 0.06 4.24 1.74 0.000002 0.0004 0.00020.0002(lb/hr) 0.03 i 0.00001 0.001 0.002 0.001 (T/yr) 0.01 0.02

TABLE 3-1
SUMMARY OF PROPOSED ALLOWABLE EMISSION RATES
PERMIT BY RULE REGISTRATION
JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

CALCULATION OF SITE FUGITIVES (FIN FUG) POTENTIAL TO EMIT PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

		Emission	Annual Operating	Maximum	Maximum	Reduction	PTE	PTE VOC	PTE	PTE II ₂ S
Component	Number of Components	Factors * (1b/hr-component)	Hours (hr/yr)	VOC* (wt%)	H ₂ S (wt%)	Credit * (%)	Hourly ^b (lb/hr)	Annual ° (T/yr)	Hourly b (1b/hr)	Annual ° (T/yr)
Valves										
Gas Streams	48	0.00992	8,760	30%	0.04%	%0	0.14	0.63	0.0002	0.001
Light Oil	29	0.0055	8,760	100%		%0	0.16	0.70	1	1
Water/Light Oil	45	0.000216	8,760	ł	ı	%0	0.01	0.04	1	ł
<u>Pumps</u> Water/Light Oil	-	0.000052	8,760	I	ı	%0	0.0001	0.0002	ļ	ı
Flanges										
Gas Streams	70	0.00086	8,760	30%	0.04%	%0	0.02	0.08	0.00002	0.0001
Light Oil	26	0.000243	8,760	100%	ı	%0	0.01	0.03	ı	ı
Water/Light Oil	∞	0.00000	8,760	1	ı	%0	0.00005	0.0002	1	;
Connectors										
Gas Streams	75	0.00044	8,760	30%	0.04%	%0	0.01	0.04	0.00001	0.0001
Light Oil	09	0.000463	8,760	100%	1	%0	0.03	0.12	ı	ı
Water/Light Oil	06	0.000243	8,760	1	:	%0	0.02	0.10	ı	;
						TOTAL:	0.40	1.74	0.0002	0.001

a Fugitive Emission Factors and Reduction Credits are per TCEQ Technical Guidance Document for Equipment Leak Fugitives, dated October 2000. The emission factors are for total hydrocarbon, except for the emission factors associated with Water/Light Oil. As indicated on page 6 of 55 in the mentioned Guidance document, these factors are based off of a known stream constituency of 50%-99% water, and remainder VOC. Therefore, applying a VOC wt % would be double counting for the reduction due to water.

^b Hourly VOC emission rates are calculated as follows:

 $^{(48 \}text{ components}) * (0.00992 \text{ lb/hr-component}) * (30\% \text{ VOC}) * (100\% - 0\% \text{ reduction credit}) = 0.14 \text{ lb/hr}$

 $^{^{}c} \ Annual \ VOC \ emission \ rates \ are \ calculated \ as \ follows: \\ (48 \ components) \ ^{*} \ (0.00992 \ lb/hr-component) \ ^{*} \ (8,760 \ hr/yr) \ ^{*} \ (30\% \ VOC) \ ^{*} \ (100\% \ - \ 0\% \ reduction \ credit) \ / \ (2,000 \ lb/T) = 0.63 \ T/yr \)$

SUMMARY OF TANKS SENT TO FLARE POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

FL-1 TK-02	10-01	TK-01	EPN FIN				
	FL-1 TK-02 500 bb1 Condensate Storage Tanks 44.56 TK-03		Description				
0.22			(lb/hr) (T/yr)	Hourly	Flash Er		
0.96	195.17		(T/yr)	Annual	nissions		
0.76	86.19		(lh/hr)	Hourly	Working Brea		
0.01	16.75		(T/yr)	Hourly Annual	thing Emissions	VOC Emissions	
0.98	130.75		(lb/hr) (T/yr)	Hourly	Uncontro	ssions	
0.97	211.92		(T/yr)	Annual	lled Total		
0.02	2.62		(lb/hr)	Hourly	Controli		
0.02	4.24		(T/yr)	Annual	rolied Total ^d		
0.0001	0.01		(lb/hr)	Hourly	Uncontro		
0.0004	0.04		(T/yr)	Annual	iled Total	H ₂ S En	
0.000002	0.0002		(lb/hr) (T/yr) (lh/hr) (T/yr)	Hourly	Controli	H ₂ S Emissions ^c	
0.00001	0.001		(T/yr)	Annual	ed Total ^d		

b The Working/Breathing emissions are calculated using AP 4.2 Chapter 7 calculations with data inputs from the stream data and throughputs. See the following pages for the represented calculations.

^c The Ideal Gas Law was used to estimate the H2S emission rates using the maximum sulfur concentration in the gas coming off the tanks (200 ppm). An example calculation for hourly H2S emissions from FIN TK-04 follows: H₂S (lb/hr) = (% Vol H₂S in stream) * (Total Volumetric Flow of Gas, scf/hr) * (1 atm STP) * (34.0798 lb/lb-mol H2S) / (1.314, atm-scf/lb-mol-K) / (298 K)

 H_2S (lb/hr) = $H_2S (1b/hr) = (200 \text{ ppm } /10^5) * (3.95 \text{ scf/hr}) * (1 \text{ atm}) * (34.0789 1b/lbmol H2S) / (1.314, \text{ atm-scf/lb-mol-K}) / (298 \text{ K})$

Notes:

Notes:

VOC Flash Emissions are calculated using the WinSim stream simulation program. Data inputs included the pressurized stream data and throughputs represented in this submittal. See the pages at the end of this attachment for a printout of the data inputs and emissions reports.

d All VOC tank emissions are routed to the flare control device with a capture and control efficiency of 98%. 14S emissions are captured at 98% and then 98% converted to SO₂ during combustion.

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT PERMIT BY RULE REGISTRATION JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

l				
2	ariable	ariable Description	Units	Value
	1	tatal loss = Ls + Lw	Ton/yr	Soe Table
	Ls	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
	,	working toss = 0.001 Mv Pv Q Kn Kp	lbíyr	See Table
<u> </u>	ť	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
L		Roof Construction		Cone
Ш	RVP	Condensale Reid Vapor Pressure	bisa	11.05
Ŀ	νPb	Broather vent pressure range	BSi	90.0
	_	Solar insolation factor	8tu/ft2-day	1521
	٩	Atmospheric Pressure	bsia	14.7
	Μv	Vapor Molecular Weight	lb/lb-mat	\$
	_	Annual Avarage Temperatura	4.	72.1
Ш	T _{vx}	Daily Maximum Ambient Temperature	'n	5416
	TAN	Daily Minimum Ambient Temperature	å	522.5
	۵T۸	Daily average ambient temperature range	å	19.1
_	φ	Product factor		-

	۲	Standing L per tani (lb/yr)	-	-
	٨	Turnover	0.27	1.00
	Ks	Vented Vapor Sat. Factor	0.11	96.0
	ş	Vapor Space Expan. Factor	1.0933	0.0662
	∆Pv Ke	Dally Vapor Pressure Range	3.18790	0.02005
	¥	Vapor Denaity (Ib/N3)	0.08044	0.00019
	ď,	Average Vapor Pressure (psis)	11.649	0.032
	Hvo Vv T _t	Daily Average Average Liquid Vapor Surface Temp Pressure 'R (pols)	539.8	539.8
	^	Vapor Space Volume (ft3)	1428.4	1428.4
	Hvo	Vapor Space Outage (#)	12.63	12.63
	ΔTv	Dally Vapor Temp. Range	36.75	36.75 12.63 1428.4
Material Specifications		Annual thruput (bbt)	146,000	
	Q ²	Max. Hourly Thruput (bbl/hr)	195	185
	PHAX	Reid Vapor Pressure (psia)	11.05	0.111
æ	Mv	Vapor Molecular Weight	40	35
	מ	Paint Solar Absorbance Factor	0.54	0.54
		Paint Canditions	Good	Good
Tank Specifications	Coior	PaintColar	Gray	Gray
	Capacity	Fank Capacity (bbl)	200	500
	+4/1	Tank Height/ Length (ft)	22	25
	٥	Tank Diameter (II)	12	12
	H/A	Tank Type	>	>
		No. of Tanks	3	-
	_		ate	

NOTE: Tank working and hreathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and OIT Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

CALCULATION OF TRUCK LOADING POTENTIAL TO EMIT PERMIT BY RULE REGISTRATION

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Sample Calculations for condensate:

Loading Loss (lbMgal) = 12.46 * S * P * M / T (AP-42 Section 5.2) Maximum Loading Loss = 12.46 * 0.60 * 11.050 * 40 / 560 - 5.900 lb/Mgal

Hourly Uncollected Emissions PTE = (Hourly Throughput, Mgal/hr) * (Maximum Loading Loss, lb/Mgal) * (1 - Capture Efficiency) Hourly Uncollected Emissions PTE = $(8.19 \, Mgal/hr)$ * $(5.900 \, lb/Mgal)$ * $(1 - 0.987) = 0.63 \, lb/hr$

Annual Emissions = ((Annual Throughput, Mgal/yr) * (Average Loading Loss, lb/Mgal) * (Capture Efficiency) * (1 - Control Efficiency)) + (Annual Uncollected Loading Emissions, lb/yr)) / (2000 lb/T) Annual Emissions = (6132.00 Mgal/yr) * (5.800 lb/Mgal) * (0.987) * (1 - 0.98) + (462.35 lb/yr) / (2000 lb/T) = 0.58 T/yr

Hourly PTE = ((Hourly Throughput, Mgal/hr) * (Maximum Loading Loss, lb/Mgal) * (Capture Efficiency) * (1 - Control Efficiency)) + (Hourly Uncollected Loading Emissions, (lb/hr)) Hourly PTE = (8.19 Mgal/hr) * (5.900 lb/Mgal) * (6.987) * (1 - 0.98) + (6.63 lb/hr) = 1.58 lb/hr

<u> </u>	FIN	EPN	Facility Name	δ	P @ 560 °R (psia)	P@531.7 °R (psia)	Z	Maximum Loading Loss (lb/Mgal)	Average Loading Loss (lb/Mgal)	Hourly Throughput (Mgal/hr)	Annual Throughput (Mgals/yr)	Capture Efficiency	Hourly Uncollected Loading Emissions (lb/lir)	Annual Uncollected Loading Emissions (lb/y1))	Control Efficiency	Hourly PTE (lb/hr)	Annual PTE (Τὸτ)
	TRUCK1	FL-1	Condensale Truck Loading	0.60	11.05	10.306	40	5.90	5.80	8.19	6,132.00	0.987	0.63	462.35	0.98	1.58	0.58
	TRUCK2	FL-1	Produced Water Truck Loading	0.60	0.11	0.024	35	0.05	0.05	8.19	383.25	0.987	0.01	0.25	0.98	0.02	0.0003
υl	Taily maximus	m and daily m	Daily maximum and daily minimum ambient temperature from Tanks 4.09d for this area's annual averages (81.6 and 62.5, for average of 72.1).	ture from Tan	ks 4.09d for this are	a's annual averages	(81.6 and 62.5	, for average of 7.	2.1).								

SUMMARY OF PROCESS FLARE FUEL GAS COMBUSTION AND WASTE GAS COMBUSTION POTENTIAL TO EMIT-NORMAL OPERATIONS

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			Ö	00	ž	č	SO_2	2	H ₂ S	S	٥٨	Ç
EPN	FIN	V Description	(lb/hr)	(lb/hr) (T/yr)	(lb/hr)	(lb/hr) (T/yr)	(lb/hr) (T/yr)	(T/yr)	(lb/hr) (T/yr)	(T/yr)	(lb/hr)	(lb/hr) (T/yr)
FL-1	FL-1	Pilot Gas Combustion	0.01	0.04	0.003	0.01	0.001	0.002	0.0000002	0.000001	0.0001	0.0004
FL-1	FL-1	Flare Assist Gas Combustion	0.44		0.22	96.0	0.04	0.18	0.00001	0.00004	0.01	0.04
FL-1	FL-1	Waste Gas Combustion	1.70	2.19	98.0	1.10	0.02	0.07	0.0004	0.002	0.02	0.02
		Totals:	2.15	4.16	1.08	2.07	0.06	0.25	0.0004	0.002	0.03	0.06

CALCULATION OF FLARE PILOT GAS and FLARE ASSIST GAS POTENTIAL TO EMIT PERMIT BY RULE REGISTRATION JO ANN ESSE UNIT F1

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* E.		HL-1 FI			FI1 FI	EPN	
mission Factors for hour for hour CO (1b/hr CO (1b/hr)		FL-1			FC-1	FIN	
* Emission Factors for CO and NO _X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FL-1 follows: CO (lb/hr) = (Heat Release, scf/hr) * (Lower Heating Value, Btu/scf) * (MM/10)*(Emission Factor, lb/MMBtu) CO (lb/hr) = (15 scf/hr) * (1,292 Btu/scf) * (MM/10^6)*(0.2755 lb/MMBtu) CO (lb/hr) = (15 scf/hr) * (1,292 Btu/scf) * (MM/10^6)*(0.2755 lb/MMBtu)		Flare 1- Process Flare Assist Gas Combustion			Flare 1- Process Pilot Combustion	Description	
Traft TNRCC Guida ows: r Heating Value, Bt. (MM/10^6)*(0.2755		1,292			1,292	LHV (Btu/scf)	
ince Document for Fla J/scf) * (MM/10)*(En J/sub/MMBtu)		1,250			15	Heat Release sef/hr	
res and Vapor Ox vission Factor, lb/		8,760			8,760	Operating Hours (hr/yr)	
idizers (dated 10/00) MMBtu)	PM/PM ₁₀ /PM _{2.5} SO ₂ H ₂ S VOC	X CO	H ₂ S VOC	PM/PM ₁₀ /PM _{2.5} SO ₂	NO _x	Pollutant	
for non-assisted	200 200 200 5.5	0.2755 0.138	200 5.5	° 200	0.2755 0.138	Emission Factors	
high-Btu flares	ppm H ₂ S ppm H ₂ S lb/MMscf	lb/MMBtu	ppm H ₂ S lb/MMscf	 ppm H,S	Ib/MMBtu	Units	
; An example	0.04 0.00001 0.01	0.44 0.22	0.0000002	0.0005	0.01	Emiss Hourly a (lb/hr)	
	0.18 0.00004 0.04	1.93	0.000001 0.0004	0.002	0.04	Emission Rates ly * Annual ^b ır) (T'yr)	

The Emission Factors for SQ, and VOC were based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

 $VOC\ (lbhr) = \ (Heat\ Release,\ scf/hr) * (MM/10^5) * (Emission\ Factor,\ lb/MMscf)$ $VOC\ (lb/hr) = \ (15\ scf/hr) * (MM/10^56) * (5.5\ lb/MMscf)$

0.0001 lb/hr VOC

A material balance approach was used to estimate the SQ and H2S emission rates using the maximum sulfur concentration in the natural gas. As shown in Figure 5-1, §S uncombusted and unconverted. An example calculation for hourly SQ emissions for the pilot gas of EPN FL-01 follows: concentration at the site is conservatively represented at 150 ppm. When used as a pilot gas or flare assist gas, 98% of this concentration will be converted to SQ, and 2% will remain

SO₂ (lb/hr) = Heat Release (scf/hr)*(Sulfur Content, ppmv)*(98% conversion to SQ)*(1 lb-mol/379 scf)*(34.065 lb H2S/lb-mol)*(64.06 lb SQ/34.065 lb H2S)

SO₂ (lb/tr) = (15 scf/tr)*(200 ppm H2S)/10^6 scf gas)*(1 lb-mol/379 scf)*(98% converted to SO2)*(34.065 lb H2S/lb-mol)*(64.06 lb SO2/34.065 lb H2S)

0.0005 lb/hr SO₂

^b An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Hourly Emissions, lh/hr)*(Annual Operating Hours, hr/yr)*(1 T/2,000 lb)

CO(T/yr) = (0.01 lb/hr)*(8,760 hr/yr)*(1 T/2,000 lb)

^v The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS PERMIT BY RULE REGISTRATION

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				Waste Gas	Waste Gas Flow Rate				Potentia	Potential to Emit
EPN	N.	Description	LHV*	Hourly (MMBtu/hr)	Annual	Pollutant	Enission	l'inite	Hourly days	Annual
			()		ı	Contract		CHIC	(111/01)	(Tyr)
FL-1	FL-1	Process Flare	2,088	6.13	15,800.24	0.0	0.2755	lb/MMBtu	69.1	2.18
		Condensate Tanks and Loading				NO _x	0.1380	lb/MMBtu	0.85	1.09
						PM/PM ₁₀ /PM _{2.5}	Ĭ	ı	:	1
						SO ₂	ĭı	ı	0.02	0.07
						H ₂ S	ĭı	ı	0.0002	0.001
						VOC	5.5	lb/MMscf	0.02	0.02
FL-1	FL-1	Process Flare	1,779	0.05	11.79	00	0.2755	lb/MMBtu	10.0	10'0
		Produced Water Tank and Loading				NO _x	0.1380	lb/MMBtu	0.01	0.005
						PM/PM ₁₀ /PM ₂₅	ĭı	1	:	1
						SO_2	٠,	ı	0.0002	0.001
						S _c H	٦,	ı	0.0002	0.001
						70V	5.5	lb/MMscf	0.0002	0.0001

*Waste gas stream lower heating value was taken from WinSim calculated stream value.

Emission Factors for CO and Noy, are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Bu flares. An example calculation for hourly CO emissions for EPN FI-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu) CO (lb/hr) = (6.13 MMBtu/hr)*(0.2755 lb/MMBtu)

The Enrission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows.

e H₂Se missions are routed from the tanks to the flare and from the seperator to the flare and then converted to SO₂. H₂S emissions rates were determined based on the combusion efficiency of 98% H₂S converted to SO₂. H₂S emitted at the flare is 2% of the stream not converted by combustion. An example calculation for hourly SO₂ emissions for EPN FL-1 follows: SO₂ (tb/nt) = (Source H₃S Emission Rate, 1b/hn.) * (98% captured H₂S stream) * (98% conversion to SO₂ at combustion) * (1 mol H₂S/3+07 lb H₂S) * (64.06 lb SO₂/1 mol SO₂) SO₂ (tb/nt) — (0.010 lb/hr.H2S at Condensate Tanks) * (98%) * (98%) * (1 mol H₂S/3+07 lb H₂S) * (64.06 lb SO₂/1 mol SO₂) VOC (tb/tn) = (Hourly Waste Gas Flow Rate, MMBushr) / (Lover Heating Value, Bruset) * (Emission Factor, lbMMset) VOC (tb/tn) = | (6.13 MMBushr) / (2.088 bullses) * (5.3 bullses) * (5.4 bulls

⁴ An example calculation for annual CO emissions for EPN FL-1 follows: CO (T/yr) = (Annual Waste Gas Flow Rate, MMBtu/yr) * (Emission Factor, Ib/MMBtu) * (1 T/2,000 lb) CO (T/yr) = (15,800.24 MMBtu/yr) * (0.2785 lb/MMBtu) * (1 T/2,000 lb)

" The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible

PERMIT BY RULE REGISTRATION CALCULATION OF FLARE FEED RATES FROM FINS TR-01 THROUGH TR-03, and TRUCKI

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BURLINGTON RESOURCES OIL & GAS COMPANY LP

Hydrocarbon Emissions (TPY): 378.17 263.90 Hydrocarbon Emissions (lb/hr): VOC Emissions (TPY): 229.36 178.25 VOC Emissions (lb/hr): TK-01 through TK-03 and TRUCK1 Total Emissions: $^{\rm a}$

	Heating	Condensate Tanks Flash Gas		K-03 and TRUCK1	Нате Fe	ed Rate ^d
Constituent	dalue ^b (Btu/lb)	(%) 14819W	Hourly (14/dl)	IsunnA (11/T)	Hourly (MMBtu/br)	kunnA TylutaMM)
эивг	73,861	%£6'\$Ĭ	46.82	ÞZ [*] 09	60°I	82.718,2
əu	22,304	%£5.02	₽ £.09	⊅9. 77	1.32	01.405,5
ane	21,646	%79 [.] SZ	05.27	68.96	09.1	79.011,4
tane	21,242	%99°\$	16.63	04,12	₹.0	76.098
tane	21,293	%\$L'EI	85.04	96.1 €	48.0	18.831,2
htane	21,025	%8t*t	71.51	₽6.9I	7.C.0	80.869
อนผน	27,072	% † 8. †	14.22	18.30	62.0	18.227
opentane	20,350	%00.0	00.0	00.0	00.0	00.0
xane	826,02	%5€.€	28.6	12.67	0.20	17.918
орехзие	20,195	%LE.0	1.09	1.40	20.0	25.42
r Hexanes	876,02	%00`0	00.0	00.0	00.0	00.0
sanes	20,825	%S7"I	19.€	£7.4	70.0	90.591
səu	747,02	%8£.0	1.12	1.44	0.02	98.88
saut	789,02	0.12%	25.0	6.45	10.0	18.25
snlq sau	8£9,02	%Z£.0	* 6.0	1.2.1	20.0	\$6.84
ene	741'81	%LI.0	02.0	* 9.0	10.0	67.22
əuə	18,422	% ZZ.0	č 9.0	€8.0	10.0	L6.62
penzene	18,658	%70.0	90.0	80.0	100.0	2.93
əu	18,438	%11.0	26.0	0.42	10.0	81,21
	NOC	%\$9.09				*
	Αος	%\$9'09			£1.9	15,800.24

from the Condensate Truck Loading. Total Hydrocarbon Emissions were calculated as follows: a Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-01 through TK-03 on the Tank Summary table with the uncontrolled emissions

Total HC (lb/hr) = VOC Emissions (lb/hr) * (l / VOC% of stream)

ъ4/41 06.562 Total HC (lb/hr) = (1/8.25 lb/hr) * (1/60.65%)

Total HC (lb/hr) =

^b Heating values taken from Perry's Chemical Engineers' Handbook, Table 3-207 (pg. 3-155)

 $(0.01) \times 88 * (\text{in/it } 8.8.9) * (\text{di/itB } 188.52) = \text{snrith} \text{M.M}$

1.09 MMBtu/hr MMBtu/hr Methane =

 $MMBtu/yt Mcthanc = (23,861 Btu/lb) * (60.24 T/yt) * (2,000 lb/T) * 98% / (10^6)$ MMBru/yr Methane = Methang Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10% An example calculation for the annual flare feed rate for Methane is demonstrated.

2,18 MMBtu/yr ■ MMBtulyτ Methane

[.]msrgorq mi2niW Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Condensate Flash Gas stream constituents weight percents, generated by the

^d An example calculation for the hourly flare feed rate for Methane is demonstrated.

CALCULATION OF FLARE FEED RATES FROM FIN TK-04 and TRUCK2

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BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-04 and TRUCK2 Total Emissions:

VOC Emissions (lb/lnr): 1.48
VOC Emissions (TPY): 0.98
Hydrocarbon Emissions (lb/lnr): 2.43
Hydrocarbon Emissions (TPY): 1.61

	Heating	Produced Water Tanks Flash Gas	TK-04 and TRU	CK2 Emissions ^c	Flare Fe	ed Rate ^d
Constituent	Value ^b (Btu/lb)	Weight (%)	Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.69%	0.38	0.25	0.01	11.69
Ethane	22,304	20.31%	0,49	0.33	0.01	14.43
Propane	21,646	25.51%	0.62	0.41	0.01	17.39
I-Butane	21,242	5.72%	0.14	0.09	0.003	3.75
N-Butane	21,293	13.87%	0.34	0.22	0.01	9.18
I-Pentane	21,025	4.52%	0.11	0.07	0.002	2.88
N-Pentane	21,072	4.89%	0.12	0.08	0.002	3.30
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.38%	0.08	0.05	0.002	2.05
Cyclohexane	20,195	0.37%	0.01	0.01	0.0002	0.40
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.27%	0.03	0.02	0.001	0.82
Octanes	20,747	0.38%	0.01	0.01	0.0002	0.41
Nonanes	20,687	0.12%	0.003	0.002	0.0001	0.08
Decanes Plus	20,638	0.33%	0.01	0.01	0.0002	0.40
Benzene	18,172	0.17%	0.004	0.003	0.0001	0.11
Toluene	18,422	0.22%	0.01	0.004	0.0002	0.14
Ethylbenzene	18,658	0.02%	0.0005	0.0003	0.00001	0.01
Xylene	18,438	0.11%	0.003	0.002	0.0001	0.07
	voc	60.88%				
				Total	1: 0.05	67.11

^a Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-04 on the Tank Summary table and the uncontrolled emissions associated with the produced water loading, FIN TRUCK2. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/VOC% of stream)

Total HC (lb/hr) = (01.48 lb/hr) * (1/60.88%)

Total HC (lb/hr) =

2.43 lb/hr

 $MMBtu/hr\ Methane = Methane\ Heating\ Value\ (Btu/lb)\ *\ Hourly\ Methane\ Emissions\ (lb/hr)\ *\ 98\%\ of\ stream\ is\ combusted\ /\ 10^6$

MMBtu/hr Methane = (23,861 Btu/lb) * (0.38 lb/hr) * 98% / (10^6)

MMBtu/hr Methane =

0.01 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10⁶

MMBtu/yr Methane = $(23,861 \text{ Btu/lb}) * (0.25 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98% / (10^6)$

MMBtu/yr Methane =

11.69 MMBtu/yr

^b Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

^c Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Produced Water Flash Gas stream constituents weight percents, generated by the WinSim program.

^d An example calculation for the hourly flare feed rate for Methane is demonstrated.

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CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT DURING FLARE DOWNTIME -SMSS PERMIT BY RULE REGISTRATION

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	°R
	ź
	ž
	ň
	lb/lb-mol
	psia
В	Btu/ft2-day
	psi
	psia
	lb/hr
	lb/yr
\ \ \	lb/yr
	Tonfyr
	Cilita

_	Ц	<u>•</u>	_	
25	25	Tank Height/ Length (ft)	H/L	Tank
500	500	Tank Capacity (bbl)	Capacity Color	Tank Specifications
Gray	Gray	Peint Color	Color	ations
Good	Good	Paint Conditions		
0.54	0.54	Paint Solar Absorbance Factor	Ω	
35	40	Vapor Melecular Weight	M۷	Materi
0.111	11.05	Reid Vapor Pressure (psia)	PMAX	Material Specifications
500	500	Max. Hourly Storage (bbl/hr)	ď	
	36.75	Max. Hourly Oally Vapor Storage Temp. Range (bbl/hr) "F	ΔΤν	
12.63	12.63	Vapor Space Outage	Hvo	
53 539.8	539.8	Average Liquid Surface Temp	T _{LA}	
0.032	11.649	Average Vaper Pressure (psia)	Py	
0.00019 0.02005	0.08044	Vapor Density (ib/ft3)	٧٧	
0.02005	3.18790	Daily Vapor Pressure Range	ΔΡν	
0.0662	1.0933		\$	
0.98	0.11	<u> </u>	Ks	
0.7	302.62	Standing Loss per tank (ibiyr)	L'S	
0.001	1.73	Tetal Loss (ib/hr)		6
Londin	0.15	Totai Loss (T'yr)	Ŧ	

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

The emissions shown are due to flare maintenance occurring 2% of the year. During the flare downtime the wellhead would be shut in. Therefore there would be no condensate or produced water liquids flowing to the tanks, however any liquid already in the tanks would read have breathing (standing losses) emissions. These emissions would not be controlled, as the flare is down for maintenance. The calculations shown demonstrate this alternative operating scenario regarding flare maintenance and downtime. Based on 2% downtime, this scenario is being shown to occur for 175.2 hours in a year.

As shown on the summary page representing the Tank Emission sent to Flare, HS emissions are represented as occuring when the liquid streams flash during the change from a pressurized flow to the atmospheric tank. Due to the chemical properties of BS, the most conservative approach is to represent that all H₂S in the liquid will immediately flash, and there will be no HS emitted during working and breathing while the liquids are stored. Since there will be no liquid flow during the flare downtime, there are no flash emissions and therefore no XI emissions from the standing loss of the tanks.

CALCULATION OF SEPARATOR GAS ROUTED TO FLARE POTENTIAL TO EMIT - SMSS

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									JUA	Potential to Emit (PTE)	mit (PTE)	
Gas Throughput at Site (MSCF/day)	Gas Throughput (MSCF/hr)	Percentage of Year Separator Stream to Flare	Number of Hours per Year sent ta Flare	Gas Volume Sent ta Flarc (MSCF/yr)	Gas Stream Molecular Weight (lb/lb-mol)	Max VOC Percentage in Gas (wt%)	Max H ₂ S Percentage in Gas (wt%)	Capture and Control Efficiency on Flarc (%)	Hourly Emission Rate ^b E (lb/hr)	Annual Emission Rate (T/yr)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (T/yr)
1500	62.50	%9	525.6	32,850	23.63	30%	0.04%	%86	23.38	6.14	0.03	0.01

^a During engine maintenance at other downstream sites, the low pressure separator gas at this site may be rouled to flare 6% of the year.

^b Hourly VOC emission rates are calculated as follows:

⁽Gas Throughput, MSCE/hr) / (379 sc@lb-mol) * (Gas Stream MW, lb/lb-mol) * (Maximum VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) = (VOC Emissions, lb/hr)

^{(62.50} MSCF/hr) / (379 scf/lb-mol) * (23.63 lb/lb-mol) * (30%) * (100% - 98%) * (1000 scf/Mscf) = 23.38 lb/hr

^c Annual VOC emission rates are calculated as follows:

⁽Gas Throughput at Site, MSCEyyr) / (379 sc0fb-mol) * (Gas Stream MW, lb/b-mol) * (Max VOC Percenlage in Gas) * (Capture and Control Efficiency on Flarc) * (1000 scfMscf) / (2000 lb/T) = (VOC Emissions, Tryr) $(32,850 \, MSCFyr) / (379 \, seffb-mol) * (23.63 \, lb/lb-mol) * (30%) * (100%-98%) * (100% \, seffMsef) / (2000 \, lb/T) = 6.14 \, T/yr + 10.000 \, seffMsef) / (2000 \, lb/T) /$

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS - SMSS

PERMIT BY RULE REGISTRATION JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

	EPN	FL-1					
	FIN	FL-1					
	Description	Process Flare	LP Separator Gas to Flare Event				
	LHV* (Btu/scf)	1,335					
Waste Ga	Hourly Annual (MMBtu/hr) (MMBtu/hr)	83.07					
Waste Gas Flow Rate	Annual (MMBtu/yr)	43,661.93					
	Pollutant	СО	NO _X	$PM/PM_{10}/PM_{2.5}$	SO_2	H_2S	VOC
	Emission Factors	0.2755	0.1380	١.	10	t o	5.5
	Emission Hourly Annual Factors Units (lb/hr) (T/yr)	lb/MMBtu	lb/MMBtu	ı	ı	ı	lb/MMscf
Potenti	Hourly ^b (lb/hr)	22.89	11.46	ı	2.71	0.03	0.34
al to Emit	Annua (T/yr)	6.01	3.01	;	0.90	0.01	0.09

Bmission Factors for CO and NO_X are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FI-1 follows:

a Waste gas stream lower heating value was taken from the inlet gas analysis

CO (lb/hr) = (83.07 MMBtu/hr)*(0.2755 lb/MMBtu)CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

The Emission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows: VOC (lb/hr) = (Hourly Waste Gas FlowRate, MMBtu/hr) / (Lower Heating Value, Btu/scf) * (Emission Factor, lb/MMscf)

 $VOC (Ib/hr) = \frac{(83.07 \text{ MMBtu/hr}) / (1,335 \text{ btu/sef}) * (5.5 \text{ lb/MMsef})}{0.34}$ lb/hr VOC

the captured stream not converted by combustion. An example calculation for hourly SO2 emissions for EPN FL-1 follows: SO2 (lb/hr) = (Source H2S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO2 at combustion) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2)

e H₂S emissions are routed from the separator to the flare and then converted to SO₂. SO₂ emission rates were determined based on the combustion efficiency of 98% H₂S converted to SO₂. H₂S emitted at the flare is 2% of

SO₂ (lb/hr) = (1.500 lb/hr H2S off Seperator)* (98%) * (98%) * (1 mol H2S/34 07 lb H2S) * (64 06 lb SO2/1 mol SO2) = 271 lb/hr SO₂

d An example calculation for annual CO emissions for EPN FL-1 follows:

c The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

CALCULATION OF FLARE FEED RATES FROM LP SEPARATOR - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Max BD Volume (Mscf/hr) Max BD Volume (Mscf/yr) Gas Density (lb/scf) 62.50 32,850 0.0625

	Heating	Inlet Gas	Separator Bl) Emissions ^b	Flare Fe	eed Rate ^c
	Value ^a	Weight	Hourly	Annual	Hourly	Annual
Constituent	(Btu/lb)	(%)	(lb/hr)	(T/yr)	(MMBtu/hr)	(MMBtu/yr
Methane	23,861	47.97%	1,873.83	492.44	43.82	23,030.22
Ethane	22,304	17.86%	697.66	183.34	15.25	8,014.86
Propane	21,646	13.03%	508.98	133.76	10.80	5,674.92
I-Butane	21,242	2.61%	101.95	26.79	2.12	1,115.38
N-Butane	21,293	5.50%	214.84	56.46	4.48	2,356.32
I-Pentane	21,025	2.02%	78.91	20.74	1.63	854.67
N-Pentane	21,072	2.03%	79.30	20.84	1.64	860.72
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexanc	20,928	0.80%	31.25	8.21	0.64	336.77
Cyclohexane	20,195	0.32%	12.50	3.29	0.25	130.23
Other Hexanes	20,928	1.46%	57.03	14.99	1.17	614.87
Heptanes	20,825	0.82%	32.03	8.42	0.65	343.68
Octanes	20,747	0.21%	8.20	2.16	0.17	87.83
Nonanes	20,687	0.14%	5.47	1.44	0.11	58.39
Decanes Plus	20,638	0.04%	1.56	0.41	0.03	16.58
Benzene	18,172	0.09%	3.52	0.92	0.06	32.77
Foluene Foluene	18,422	0.24%	9.38	2.46	0.17	88.82
Ethylbenzene	18,658	0.02%	0.78	0.21	0.01	7.68
Xylene	18,438	0.10%	3.91	1.03	0.07	37.22
	-			Totals:	83.07	43,661.93

^a Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

Methane (lb/hr) = Maximum BD Volume (Mscf/hr) * Gas Density (lb/scf) * Inlet Gas Weight % * 1000

Methane (lb/hr) = (62.50 Mscf/hr) * (0.0625 lb/scf) * 47.97% * 1,000

Methane (lb/hr) = 1,873.83 lb/hr

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10⁶

MMBtu/hr Methane = $(23,861 \text{ Btu/lb}) * (1,873.83 \text{ lb/hr}) * 98\% / (10^6)$

MMBtu/hr Methane =

43.82 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = $(23,861 \text{ Btu/lb}) * (492.44 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98% / (10^6)$

MMBtu/yr Methane =

23,030.22 MMBtu/yr

b Constituent Emission Rates were calculated from the known maximum blowdown volumes and density then proportioned using the Inlet Gas stream constituents weight percents. An example calculation for Methane emissions is as follows:

^c An example calculation for the hourly flare feed rate for Methane is demonstrated.

DESIGN II for Windows

CONDENSATE SUMMARY REPORT

SOLUTION REACHED

Simulation Result:

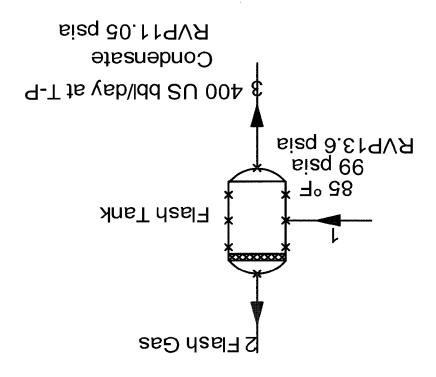
Task: Project: Problem:

By:

3:05 PM

8-Feb-12

:JA



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 STEAM	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 STEAM	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Flowrates	•		•		•	
Component Name	Total Ibmol/hr	Vapor Ibmol/hr	Liquid 1 lbmol/hr	Liquid 2 Ibmol/hr	Total mole %	K-Value
46: NITROGEN	0.01813	0	0.01813	0	0.048001	
49 : CARBON DIOXIDE	0.047214	0	0.047214	0	0.125003	
2 : METHANE	0.793577	0	0.793577	0	2.10104	
3 : ETHANE	0.786023	0	0.786023	0	2.08104	
4 : PROPANE	1.36695	0	1.36695	0	3.61907	
5 : ISOBUTANE 6 : N-BUTANE	0.47592 1.50783	0	0.47592 1.50783	0	1.26003 3.99208	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.04967	ő	1.04967	ő	2.77906	
8 : N-PENTANE	1.44664	Ō	1.44664	Ō	3.83008	
54: 2,2-DIMETHYLBUTA	0	0	0	0	0	
55: 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	2.77506	0	2.77506	0	7.34715	
37: METHYLCYCLOPENTA 40: BENZENE	0 0.160906	0	0 0.160906	0 0	0 0.426009	
38 : CYCLOHEXANE	0.40642	0	0.40642	0	1.07602	
79 : 2-METHYLHEXANE	0.40642	0	0.40642	0	0	
80 : 3-METHYLHEXANE	0	Ö	Ö	Ö	0	
11 : N-HEPTANE	2.93975	ō	2.93975	ō	7.78316	
39: METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.68895	0	0.68895	0	1.82404	
12 : N-OCTANE	2.49971	0	2.49971	0	6.61813	
45 : ETHYL BENZENE	0.167327	0	0.167327	0	0.443009	
43 : M-XYLENE	0.994899	0	0.994899	0	2.63405	
42 : O-XYLENE 13 : N-NONANE	0 2.25382	0	0 2.25382	0	0 5.96712	
14 : N-DECANE	17.3918	0	17.3918	o	46.0459	
62 : WATER	0	Ö	0	ŏ	0	
Total	37.7706	0	37.7706	0	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.50789	0	0.50789	0	0.012061	
49 : CARBON DIOXIDE	2.07784	ŏ	2.07784	ő	0.049344	
2 : METHANE	12.7313	0	12.7313	0	0.302338	
3 : ETHANE	23.6341	0	23.6341	0	0.561253	
4 : PROPANE	60.2742	0	60.2742	0	1,43136	
5 : ISOBUTANE	27.6604	0	27.6604	0	0.656868	
6 : N-BUTANE	87.6353	0	87.6353	0	2.08113	
9: 2,2-DIMETHYLPROP 7: ISOPENTANE	0 75.7293	Ö	0 75.7293	0	0 1. 7 9839	
8 : N-PENTANE	104.37	Ö	104.37	ő	2.47852	
54: 2,2-DIMETHYLBUTA	0	Ö	0	Ō	0	
55: 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	239.133	0	239.133	0	5.67882	
37: METHYLCYCLOPENTA 40: BENZENE	0	0	0 12.5681	0 0	0 0.298461	
38 : CYCLOHEXANE	12.5681 34.2027	0	34.2027	0	0.812231	
79 : 2-METHYLHEXANE	0	0	0	Ö	0.012231	
80 : 3-METHYLHEXANE	ő	Ö	ŏ	ő	Ö	
11 : N-HEPTANE	294.557	Ö	294.557	Ö	6.99501	
39: METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	63.4757	0	63.4757	0	1.50739	
12 : N-OCTANE	285.527	0	285.527	0	6.78057	
45 : ETHYL BENZENE	17.7635	0	17.7635	0	0.421839	
43 : M-XYLENE	105.618	0	105.618	0	2.50818	
42 : O-XYLENE	0 289.052	0	0 289.052	0	0 6.86429	
13 : N-NONANE 14 : N-DECANE	289.052 2474.44	0	289.052 2474.44	0	58.7619	
62 : WATER	0	0	0	0	0	
Total	4210.96	0	4210.96	0	100	

100	0	95,4479	0	95.4479	listo T
	^				
0	0	0	0	0	33TAW : S3
7089.88	0	84.0528	0	24.0528	14: N-DECANE
20YST.8	0	£80S4.9	0	6.42083	13 : N-NONANE
2.04233 0	0	0	0	0	45 : O-XACENE
	0	98646.1	0	9£6 + 6.1	43: W-XACENE
14524E.0	0 0	0.326758	0	827925.0	45 : ETHYL BENZENE
1.22313 6.78493	0	70974.3	0	70974.8	12: N-OCTANE
0	0	0 34731.1	0	24731.1	41: TOLUENE
44091.7	0	£1£38.3	0	£1£38.3 0	14: WHEPTANE 39: METHYLCYCLOHEXAN
0	ő	0	Ö	0	80:3-METHYLHEXANE
Ö	ő	ő	Ö	Ö	79: 2-METHYLHEXANE
875557.0	ő	≯66669°0	Ö	7 66669'0	38 : CACTOHEXANE
7852.0	Ö	\$£8722.0	ő	₽£8722.0	40 : BENZENE
0	ő	0	Ö	0	37 : METHYLCYCLOPENTA
96610.9	0	5.77455	Ö	33477.3	10: N-HEXANE
0	Ō	0	Ö	0 .	53: 3-METHYLPENTANE
Ö	Ō	ō	Ö	Ö	52: 2-METHYLPENTANE
0	0	ō	0	Ö	55: 2,3-DIMETHYLBUTA
0	0	o	0	Ö	54: 2,2-DIMETHYLBUTA
12877.S	0	47120.S	0	47188.S	8 : N-PENTANE
2.03685	0	51 44 6.1	0	1.94413	7: ISOPENTANE
0	Ō	0	ŏ	0	9:2,2-DIMETHYLPROP
2,52066	0	Z:40592	0	26504.2	BNATU8-N: a
194528.0	0	288787.0	0	288787.0	5 : ISOBUTANE
19966.1	0	1.90482	0	1.90482	4 : PROPANE
1,11397	0	1.06326	0	1.06326	3 : ETHANE
142817.0	0	477088.0	0	⊅ 77083.0	2 : METHANE
494240.0	0	0.040531	0	0.040531	49: CARBON DIOXIDE
D.010574	0	0.010093	0	6.010093	46: NITROGEN
% lov bts	SCF/hr	3CF/hr	scĖnr	SCF/hr	_
IstoT	S biupiJ	∫ biupi⊿	Vapor	lstoT	Component Name
					Flowrates
100	0	7962.76	0	7962.76	Total
100	0	7962.76	0	7962.76	Total
0	0	0 7862.76	0	0 7862.76	RS: WATER
0 6970.94	0	2108. 11 0	0	\$108.44 0	14 : N-DECANE 62 : WATER
217396.3 9240.34 0	0 0 0	18208.2 2108. 11 0	0 0 0	5.808.8 44.8012 0	13 : N-NONANE 14 : N-DECANE 62 : WATER
0, 9,5459 0,0459	0 0 0	0 18 3 08.8 2108. 41 0	0 0 0	0 5108.2 0	42 : O.XYLENE 13 : N.DECENE 14 : N.DECENE 62 : WETER
2.0458.2 0 21786.3 0 0 0	0 0 0 0	285282 0 6.80587 21.08.44 0	0 0 0 0	28282.2 0 5808.2 44.8012	43 : M-XYLENE 13 : U-DECANE 14 : U-DECANE 52 : WATER
600644.0 30463.S 0 \$1736.3 6240.34	0 0 0 0 0	680164.0 88382.s 0 18808.6 2108.44	0 0 0 0 0	0.431033 2.56285 0 5.80881 44.8012 0	45: ETHYLENE 42: M-XYLENE 13: N-NONANE 13: W-NONANE 62: WETER
61819.8 600624,0 60468.5 0 21786,8 0 6240.84	0 0 0 0 0	2298.43 660184.0 68538.5 0 18608.4 0 108.44	0 0 0 0 0	22624.8 650154.0 68582.5 0 18608.2 0 2108.44	12 : N-OCTANE 43 : N-XYLENE 42 : O-XYLENE 13 : N-NOUANE 14 : N-DOLANE 52 : WATER
\$00624,0 61813.3 600644,0 60463.5 0 21736,3 0 9240.34	0 0 0 0 0 0	57477.1 52964.3 560164.0 38532.5 0 18508.2 0 2108.44	0 0 0 0 0 0	67477,1 52626,6 66262,5 68586,5 78608,8 78608,44 0	41:101ENE 42: N-CYTENE 43: N-XYLENE 43: N-XYLENE 14: N-NONANE 14: N-NONANE 14: N-DECANE
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0 67477.1 62664.0 52664.0 68058.2 0 18608.2 0 0 106.44	0 0 0 0 0 0	0 2465.3 5747,1 0 2108.44 18208.2 2108.44	49 : WETHYLCYCLOHEXAN 40 : TOLUGHE 42 : W-CCTANE 43 : W-XYLENE 43 : O.XYLENE 13 : W-NONANE 13 : WETER
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 87572.7 0 0 57477.1 52654.8 5267.64 0 28536.2 0 186368.8 0 2108.44	0 0 0 0 0 0 0	0 57272.7 0 5747.7,1 0 26262.5 0 26262.5 0 16262.4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLLIENE 43: M-XYLENE 43: M-XYLENE 13: N-NONANE 13: N-NONANE 14: N-NONANE
0 91:687.7 0 60:681.7 0 60:6940.0 204:63.0 0 204:63.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 87272.7 0 67477.1 0 52626.3 0 88238.2 0 18208.8 0 18208.8	0 0 0 0 0 0 0 0	0 257277 0 257277 0 250854 0 260854 0 260854 0 260854 0 260854 0 260854 0 260854	80:3-METHYLHEXANE 14: N-HETHYLCYCLOHEXAN 14: N-HETHYLCYCLOHEXAN 14: N-CYLENE 14: N-YOLENE 14: N-YOLENE 14: N-YOLENE 14: N-YOLENE 15: WATER
0 81681.7 0 81681.7 0 61818.8 0 80468.5 0 82468.3 0 82468.3 0	0 0 0 0 0 0 0 0	0 0 27.572.7 0 0.4572.7 0.450.9 0.450.9 0.450.9 0.50.8 0.5	0 0 0 0 0 0 0	0 67572.7 0 67572.7 0 67595.2 660164.0 68508.2 0 0 2608.44	79 : Z-METHYLHEXANE 71 : N-HEPTANE 39 : METHYLCYCLOHEXAN 40 : N-ACTANE 45 : ETHYL BENZENE 45 : W-TUENE 47 : N-ACTANE 48 : N-ACTANE 48 : N-ACTANE 19 : N-ACTANE 19 : N-ACTANE 19 : N-ACTANE 19 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 11 : N-ACTANE 12 : N-ACTANE 13 : N-ACTANE 14 : N-ACTANE 15 : N-ACTANE 16 : N-ACTANE 17 : N-ACTANE 18 : N-ACTANE 19 : N-ACTANE 19 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 11 : N-ACTANE 12 : N-ACTANE 12 : N-ACTANE 13 : N-ACTANE 14 : N-ACTANE 15 : N-ACTANE 16 : N-ACTANE 17 : N-ACTANE 17 : N-ACTANE 18 : N-ACTANE 19 : N-ACTANE 19 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 11 : N-ACTANE 12 : N-ACTANE 13 : N-ACTANE 14 : N-ACTANE 15 : N-ACTANE 16 : N-ACTANE 17 : N-ACTANE 17 : N-ACTANE 18 : N-ACTANE 18 : N-ACTANE 19 : N-ACTANE 19 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 10 : N-ACTANE 11 : N-ACTANE 12 : N-ACTANE 13 : N-ACTANE 14 : N-ACTANE 15 : N-ACTANE 16 : N-ACTANE 17 : N-ACTANE 17 : N-ACTANE 18 : N-ACTANE 18 : N-ACTANE 18 : N-ACTANE 18 : N-ACTANE 19 : N-ACTANE 19 : N-ACTANE 10
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 6990,1 0 87572,7 0 57572,7 0 5265,0 58532,5 6876,0 68532,5 68536,5 6	0 0 0 0 0 0 0 0	0 624272.7 0 67427.7.1 0 64496.2 0 6496.2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	38 : OYCLOHEXANE 80 : 3-METHYLHEXANE 11 : N-HEPTANE 13 : M-THYLHEXANE 14 : N-OCTANE 15 : M-YYLENE 17 : N-OLUBUE 18 : M-YYLENE 19 : M-YYLENE 19 : M-YOLUBUE 19 : M-YYLENE
000054.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	264517,0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	264414,0 68440,1 6840,1 6840,1 68508,2 68508,2 68508,2 68508,2 68508,4 6850	40 : BENZENE 38 : CYCHEXANE 39 : AMETHYLHEXANE 41 : N-HEPTANE 45 : ETHYLCYCLOHEXAN 46 : ETHYLCYCLOHEXAN 47 : N-OTANE 48 : M-XYLENE 49 : M-XYLENE 41 : N-OTANE 42 : M-XYLENE 43 : N-OTANE 44 : N-NONANE 45 : W-NONANE 46 : W-NONANE 47 : N-NONANE 48 : N-NONANE 49 : N-NONANE
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0 61746.7 0 20870.1 0 20870.1 0 31687.7 0 31687.7 0 20450.1 0 20460.2 1738.3 0 20459.0 0 20459.0 0 20459.0	0 0 0 0 0 0 0 0 0 0	0 62841,7 264414,0 0 68930,1 0 67572,7 0 0 27572,7 0 0 26496,2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 68841,7 584414,0 684614,0 67572,7 0 67572,7 0 67572,7 0 6858,2 6868,4 18608,2 18608,4 18608,2 18608,4 18608,2 18608,4 18608,2 18608,4 18608,2 18608,4 1	10: WHEKANE 10: WETHYLCYCLOPENTA 13: W-YOLLENE 14: W-DECANE 14: W-DECANE 14: W-DECANE 15: W-CTANE 16: S-METHYLCYCLOHEXANE 17: W-HEPTANE 18: S-METHYLLEXANE 19: M-TOLLENE 19: W-TOLLENE 19: W-TOLLENE 10: W-
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100040.0 100		0.046703 1.25623 1.25623 1.25623 1.25636 1.25636 1.26633 1.		607840,0 628421,0 628421,0 648421	49 : CARBON DIOXIDE 3 : METHANE 3 : ETHANE 4 : PROPANE 5 : ISODEUTANE 6 : N.BUTANE 6 : N.BUTANE 7 : SODEUTANE 7 : SODEUTANE 7 : SODEUTANE 8 : N.PENTANE 10 : N.BENTANE 10 : N.HEXANE 10 : N.HEXANE 11 : N.HEXANE 12 : S.A.B.B.B.B.B.B.B.B.B.B.B.B.B.B.B.B.B.B.
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Properties

Temperature	F	85	
Pressure	psia	98.696	
Enthalpy	Btu/hr	-552622.5	
Entropy	Btu/hr/R	-596.2866	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	37.7706	37.7706
Flowrate	lb/hr	4210.9587	4210.9587
Mole Fraction	10/111	1	42 10.9567
Mass Fraction		i	1
Molecular Weight		111.4876	111.4876
Enthalpy	Btu/lbmol	-14631.0071	-14631.0071
Enthalpy	Btu/lb	-131.2344	-131,2344
Entropy	Btu/lbmol/R	-15.787	-15.787
Entropy	Btu/lb/R	-0.141604	-0.141604
Ср	Btu/lbmol/R		56.3698
Ср	Btu/lb/R		0.5056
Cv	Btu/lbmol/R		49.3271
Cv	Btu/lb/R		0.4424
Cp/Cv			1,1428
Density	lb/ft3		43.2796
Z-Factor			0.043502
Flowrate (T-P)	gal/min		12.1313
Flowrate (STP)	gal/min		11.9
Specific Gravity	GPA STP		0.707396
Viscosity	cP		0.495811
Thermal Conductivity	Btu/hr/ft/R		0.068329
Surface Tension	dyne/cm		19.1391
Reid Vapor Pressure (ASTM-A	psia		13.6
True Vapor Pressure at 100 F	psia		95.25
Critical Temperature (Cubic E	F	593.0848	
Critical Pressure (Cubic EOS)	psia	479.1639	
Dew Point Temperature	F	452.1604	
Bubble Point Temperature	F	107.7105	
Water Dew Point Temperature of			
Stream Vapor Pressure	psi a	88.6915	
Latent Heat of Vaporization (N	Btu/lb	103.1429	
Latent Heat of Vaporization (P	Btu/lb	324.9526	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6065.23	
Heating Value (net)	Btu/SCF	5632.2	
Wobbe Number	Btu/SCF	2923.77	
Average Hydrogen Atoms		17.2137	
Average Carbon Atoms		7.8337	
Hydrogen to Carbon Ratio		2.1974	

Details for Stream 2 Stream 2 (Flash Gas)

WALER 0.08694 0.0869		Total VOC	44.560474				
MARCHEST 0.0884 0.0886 0.0816	lsto T	Z3.4752	S274.ET	L	0	100	
MARCHEST 0.0884 0.0886 0.0816	62 : WATER	0	0	0	0	0	
Color	14: N-DECANE						
#WALFIERE	13: N-NONANE	142880.0	142880.0	₱ 8 690.0		0.120505	
ELHALT BERKEHE	45 : O-XACENE						
Coling C	43 : W-XXFENE						
RELIATION (COLOREY) RELIATION	12 : N-DCTANE						
A	41 : TOLUENE						
Control Cont	39: МЕТНҮ СҮС СОНЕХАИ				0	0	
Control Cont	3NAT93H-N: II						
Company Comp	80:3-METHYLHEXANE						
Marchelland 1982 012523 0100008 0 0100009 0 000009 0 0 0 0 0							
Part Part	38 : CACI OREXVIE 40 : BENZENE						
Name Name	37: METHYLCYCLOPENTA						
ST-0001141	10: N-HEXANE	2.46079	2.46079	2780.0	0	3.34914	
Name Name	53: 3-METHYLPENTANE						
Part Part							
Part Part							
ротовитуме товы постава и	8 : N-PENTANE					•	
Public P	7 : ISOPENTANE						
Part Part	9 : 2,2-DIMETHYLPROP	0		0	0		
Marche 1648	BNATU8-N: 8		-				
	5 : ISOBUTANE						
Part Part							
MITROGEN 1,629-30 1,629-30 0,000106 0 2,217-30 CV-Value Poment Name Total Value Month Liquid I Liquid S Total Losal LV-Value Losal LV-Value	2 : METHANE						
MIRROGEN 0, 0,491419 0,491419 1, 10,0004 0 0,0,66823 10,0004 1,00 10,00,004 10,0,0004 10,0,0,0004 10,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,	49 : CARBON DIDXIDE						
March Marc	46 : NITROGEN						
March Marc							
Marine M	AURAL MAUNA						
Part Part	Component Name	IctoT	3006/(t binoi I topinion	Shinii	letoT.	
Part Part	Flowrates						
Part Part	ıma.		110012		•	201	
Part Part	lstoT	110311	2 10311	ŀ	0	100	
Part Part	62: WATER	0	0	0	0	0	0.024719
Parison Pari	14: N-DECANE						
Parison Pari	13 : N-NONANE						
Part Part							
Parison Pari	49 : ETHYL BENZENE						
Part Part	12: N-OCTANE						
Second S	41 : TOLUENE						
Parison Pari	39: METHYLCYCLOHEXAN						
PULIFORE DESCRIPTION OF THE PROPERTY OF THE PR	11: N-HEPTANE						
Parison Pari							
Pair Pair	38: CACLOHEXANE						
POPERT NAME OF THE PRINCE OF COORDINGS OF CO	40 : BENZENE						
Second Color Seco	37: METHYLCYCLOPENTA	0	0	0		0	960 1 51.0
BulleV-H leaf to the property of the property	10 : N-HEXANE						
Second Color Seco	53: 3-METHYLPENTANE						
Second Part Second Part							
BuleV-N lead to the first state of the first state	54: 2,2-DIMETHYLBUTA						
BulleV-M lead to the control of the	8 : N-PENTANE						
PuleV-N lead Total Apor Indicated 1 Operational 1 Operatio	7: SOPENTANE						
Pulber Note Note Note Note Note Note Note Note	9:2,2-DIMETHYLPROP				•		
Pulates Pulate P	BNATUB-N: 8						
PuleV-N Total Vapor Incipient Liquid 1 Liquid 2 Total K-Value % Incipient Mame	4: PROPANE A: BORTUROSI: 6						
ponent Name Total Vapor Incipient Liquid 1 Liquid 2 Total K-Value Ipmol/hr Ipmol/hr <td< td=""><td>3 : ETHANE</td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	3 : ETHANE						
vrates Total Vapor Incipient Liquid 1 Liquid 2 Total 1 K-Value 3 Ibmol/hr	2 : METHANE					₽869.₽€	
ชาสิยธร ponent Name Total Vapor Incipient Liquid 1 Liquid 2 Total K-Value ibmol/hr Ibmol/hr mole %	49 : CARBON DIOXIDE			0.000286			7603.13
vrates ponent Name Total Vapor Incipient Liquid 1 Liquid 2 Total K-Value	46 : NITROGEN	Q.017542	0.017542	94910000.0	0	E114E8.0	696.303
vrates ponent Name Total Vapor Incipient Liquid 1 Liquid 2 Total K-Value		lbmol/hr	lbmol/hr	ent lom	lbmol/hr	% əlou	
	Somponent Name						K-Value
ATO VORDE VIDED VORDE VIDED VORDE VORDE	Flowrates	Aghoi Aisc:	LOCGN	COLL TOUR	100an	THE TOTAL	ale.
	Thermodynamic Methods						

F	lo	w	ra	te	c

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 . ft3/hr	Liquid 2 ft3/hr	Total volume %
46 NUTDOOFN					
46 : NITROGEN 49 : CARBON DIOXIDE	6.72135 14.1854	6.72135 14.1854	0	0	0.834113 1.76039
2 : METHANE	279.602	279.602	ő	0	34.6984
3 : ETHANE	192.247	192.247	ō	ŏ	23.8577
4 : PROPANE	163.566	163.566	0	0	20.2984
5 : ISOBUTANE	27.4258	27.4258	0	0	3.40352
6 : N-BUTANE 9 : 2,2-DIMETHYLPROP	66.5565 0	66.5565 0	0	0 0	8.25959 0
7 : ISOPENTANE	17.4731	17.4731	Ö	0	2.1684
8 : N-PENTANE	18.8934	18.8934	ő	ŏ	2.34465
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53: 3-METHYLPENTANE 10: N-HEXANE	0 10.9416	0 10.9416	0	0	0
37 : METHYLCYCLOPENTA	0.9410	0	0	0	1.35784 0
40 : BENZENE	0.601058	0.601058	ō	Ö	0.074591
38 : CYCLOHEXANE	1.22199	1.22199	0	0	0.151648
79 : 2-METHYLHEXANE	0	0	0	0	0
80: 3-METHYLHEXANE 11: N-HEPTANE	0 3.52276	0	0	0	0
39: METHYLCYCLOHEXAN	3.52276	3.52276 0	0	0	0.437172 0
41 : TOLUENE	0.661696	0.661696	Ö	0	0.082116
12: N-OCTANE	0.926542	0.926542	å	ō	0.114983
45 : ETHYL BENZENE	0.060376	0.060376	0	0	0.007493
43 : M-XYLENE	0.300236	0.300236	0	0	0.037259
42 : O-XYLENE 13 : N-NONANE	0 0.264521	0 0.264521	0	0	0
14 : N-DECANE	0.636488	0.636488	0	0	0.032827 0.078988
62 : WATER	0	0	ō	ŏ	0
Total	805.808	805.808	0	0	100
Flowrates					
Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
	0017111	OOI/III	3017111	3017111	Stu VOI 76
46: NITROGEN	6.657	6.657	0	0	0.834113
49 : CARBON DIOXIDE	14.0496	14.0496	0	0	1.76039
2 : METHANE 3 : ETHANE	276.925	276.925	0	0	34.6984
4 : PROPANE	190.406 162	190.406 162	0 0	0 0	23.8577 20.2984
5 : ISOBUTANE	27.1633	27.1633	0	0	3.40352
6: N-BUTANE	65.9192	65.9192	0	Ō	8.25959
9: 2,2-DIMETHYLPROP	0	0	0	0	0
7 : ISOPENTANE	17.3058	17.3058	0	0	2.1684
8 : N-PENTANE 54 : 2,2-DIMETHYLBUTA	18.7125 0	18,7125 0	0	0 0	2.34465 0
55 : 2,3-DIMETHYLBUTA	ŏ	ő	ő	Ö	0
52 : 2-METHYLPENTANE	0	0	0	0	Ō
53: 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	10.8368	10.8368	0	0	1.35784
37 : METHYLCYCLOPENTA 40 : BENZENE	0 0.595304	0 0.595304	0	0 0	0 0.074591
38 : CYCLOHEXANE	1.21029	1.21029	Ö	0	0.151648
79: 2-METHYLHEXANE	0	0	Õ	Ö	0
80: 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	3.48904	3.48904	0	0	0.437172
39: METHYLCYCLOHEXAN 41: TOLUENE	0 0.65536	0 0.65536	0	0	0
12 : N-OCTANE	0.05536	0.917671	0	0	0.082116 0.114983
45 : ETHYL BENZENE			Ö	Ö	0.007493
43 : M-XYLENE	0.059798	0.059798	0		
	0.059798 0.297362	0.059798	0	0	0.037259
42 : O-XYLENE	0.297362 0	0.297362 0	0	0 0	0.037259 0
42 : O-XYLENE 13 : N-NONANE	0.297362 0 0.261988	0.297362 0 0.261988	0 0	0 0 0	0.037259 0 0.032827
42 : O-XYLENE 13 : N-NONANE 14 : N-DECANE	0.297362 0 0.261988 0.630394	0.297362 0 0.261988 0.630394	0 0 0	0 0 0 0	0.037259 0 0.032827 0.078988
42 : O-XYLENE 13 : N-NONANE	0.297362 0 0.261988	0.297362 0 0.261988	0 0	0 0 0	0.037259 0 0.032827

	94.86		Motor Octane Number
	6Z.14		Methane Number
	2.8241		Hydrogen to Carbon Ratio
	2.2979		Average Carbon Atoms
	2684.8		Average Hydrogen Atoms
	4.877 r	Bfr\2CE	Wobbe Number
	1800.85	BP/RCE	Heating Value (net)
	l't961	Bfn/SCF	Heating Value (gross)
	٥N		CO2 Freeze Up
	11.729	s/1 j	Vapor Sonic Velocity
	1142.030Z	eisq	Stream Vapor Pressure
	beta	onld not be calcul	Water Dew Point Temperature of
	£224.622-	4	Bubble Point Temperature
	9700.07	4	Dew Point Temperature
	1347.8257	sizq	Critical Pressure (Cubic EOS)
	9231.571	4	Critical Temperature (Cubic E
807210.0		A\f\\nt\bt	Thermal Conductivity
878600.0		Чэ	Viscosity
421910.0		MMSCFD	Flowrate (STP)
0.223836		a\£ft	Flowrate (T-P)
120166.0			Z-Factor
281190.0		£∄\di	Density
1,1641			Cp/Cv
8835.0		A\di\uta	C^
12.534		A\lomd\utB	C^
971 4 .0		A\d\\\\#8	Cp
14.5903		A\lomd\uf9	Cp C
801621.0	801921,0	A\d\\u i a	Entropy
4.5106	9012.4	A\lomd\utB	Ептору
14.5433	14.5433	dl/uf8	Enthalpy
7260.803	7260.808	lomd/lut8	Enthalpy
34.9365	34.9365		Molecular Weight
ŀ	ŀ		Mass Fraction
	ļ.		Mole Fraction
2374.ET	23.4752	JU/d!	Firwoil
2,1031	1601.2	lbmol/hr	Flowrate
Vapor	stoT		
	L		Vapor Fraction
	912984.6	A\nd\uta	Entropy
	£73.8301	Btu/hr	Enthalpy
	7.41	eizq	Pressure
	04	4	Temperature
			Properties

Details for Stream 3

Stream 3 (Condensate)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 NBS81	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 NBS81	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Flowrates	Elquio E Vico.	145001	Elquiu Z 1110.	140501	Elquiu 2 Den.	310
Component Name	Total lbmol/hr	Vapor lbmol/hr	Liquid 1 Ibmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000588	0	0.000588	0	0.001649	
49 : CARBON DIOXIDE	0.010191	0	0.010191	0	0.028573	
2 : METHANE	0.063834	0	0.063834	0	0.17897	
3 : ETHANE	0.284271	0	0.284271	0	0.797002	
4 : PROPANE	0.94005	0	0.94005	0	2.63559	
5 : ISOBUTANE	0.40434	0	0.40434	0	1.13364	
6 : N-BUTANE 9 : 2,2-DIMETHYLPROP	1.33413 0	0	1.33413	0	3.74045	
7 : ISOPENTANE	1.00406	0	0 1.00406	0 0	0 2.81506	
8: N-PENTANE	1.39733	ő	1.39733	ŏ	3.91766	
54: 2,2-DIMETHYLBUTA	0	Ō	0	ŏ	0	
55: 2,3-DIMETHYLBUTA	0	0	0	0	0	
52: 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	2.74651	0	2.74651	0	7.7003	
37 : METHYLCYCLOPENTA	0 0.159337	0	0 150227	0 0	0	
40 : BENZENE 38 : CYCLOHEXANE	0.403231	0	0.159337 0.403231	0	0.44673 1.13053	
79 : 2-METHYLHEXANE	0.403231	0	0.403231	0	1.13053	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE	2.93055	ŏ	2.93055	ő	8.21631	
39 : METHYLCYCLOHEXAN	0	0	0	Ō	0	
41 : TOLUENE	0.687223	0	0.687223	0	1.92675	
12: N-OCTANE	2.49729	0	2.49729	0	7.00158	
45 : ETHYL BENZENE	0.16717	0	0.16717	0	0.468689	
43 : M-XYLENE 42 : O-XYLENE	0.994115	0 0	0.994115	0	2.78717	
13: N-NONANE	0 2.25313	0	0 2.25313	0	0	
14 : N-DECANE	17.3902	0	17.3902	0	6.31703 48.7563	
62: WATER	0	ő	0	ő	0	
Total	35.6675	0	35.6675	0	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.016472	0	0.016472	0	0.000398	
49 : CARBON DIOXIDE	0.448511	Ö	0.448511	ŏ	0.01084	
2:METHANE	1.02409	0	1.02409	Ô	0.024751	
3 : ETHANE	8.54746	0	8.54746	0	0.206586	
4 : PROPANE	41.4506	0	41.4506	Ō	1.00183	
5 : ISOBUTANE	23.5002	0 0	23.5002	0	0.567984	
6 : N-BUTANE 9 : 2,2-DIMETHYLPROP	77.5394 0	0	77.5394 0	0	1.87 4 07 0	
7 : ISOPENTANE	72.4392	0	72.4392	0	1.7508	
8 : N-PENTANE	100.812	ŏ	100.812	ŏ	2.43655	
54: 2,2-DIMETHYLBUTA	0	0	0	Ō	0	
55: 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	236.672	0	236.672	0	5.72019	
37 : METHYLCYCLOPENTA	0	0	0 12.4455	0	0	
40 : BENZENE 38 : CYCLOHEXANE	12.4455 33.9343	0 0	33.9343	0	0.300799 0.820168	
79 : 2-METHYLHEXANE	0	0	0	ő	0.820188	
80 : 3-METHYLHEXANE	ŏ	ŏ	ŏ	ŏ	ŏ	
11 : N-HEPTANE	293.636	0	293.636	Ō	7.09696	
39: METHYLCYCLOHEXAN	0	0	0	Ō	0	
41 : TOLUENE	63.3166	0	63.3166	0	1.53032	
12 : N-OCTANE	285.251	0	285.251	0	6.89431	
45 : ETHYL BENZENE	17.7467	0	17.7467	0	0.428926	
43 : M-XYLENE 42 : O-XYLENE	105.535 0	0	105.535	0	2.55071	
13 : N-NONANE	288.964	0	0 288.964	0	0 6.98 405	
14 : N-DECANE	2474.2	0	2474.2	0	59.7998	
62 : WATER	0	ő	0	0	0	
Total	4137.48	0	4137.48	0	100	

100	0	92.8295	0	95.8295	Total
0	0	0	0	0	93 : WATEW
58.2225	Ō	9470.43	Ō	94,0476	14: N-DECANE
89116.8	0	988179	0	98814.8	13: N-NON-NE
0	0	0	0	0	45 : O-XAFENE
82860.S	0	1.94783	0	1.94783	43: M-XALENE
999136.0	0	0.32645	0	0.32645	49 : ETHYL BENZENE
99696.9	0	18691.9	0	18694.9	12: N-OCTANE
1.25448	0	1.16452	0	1.16452	41: TOLUENE
0	0	0	0	0	39 : METHYLCYCLOHEXAN
4107E.7	0	991 ₽ 8.9	0	99148.9	11: N-HEPTANE
0	0	0	0	0	80: 3-METHYLHEXANE
0	0	0	0	0	79: 2-METHYLHEXANE
40.243.04 74184 7. 0	0	£19322.0 103469.0	0 0	61922.0 103469.0	38: CACFOHEXVAE 40: BENZENE
0	0	0 332613	0	0 332613	37: METHYLCYCLOPENTA
63321.3	0	61317.3	0	£1317.2	10: N-HEXANE
0	o	0	Ö	0	53: 3-METHYLPENTANE
Ō	. 0	Ö	ŏ	0	52: 2-METHYLPENTANE
0	0	0	Ō	ō	55: 2,3-DIMETHYLBUTA
0	0	0	0	0	54: 2,2-DIMETHYLBUTA
2,7592	0	2.56135	0	2,56135	8: N-PENTANE
25.00.33	0	₹ 9698.1	0	₹9628.1	T: ISOPENTANE
0	0	0	0	0	9 : 2,2-DIMETHYLPROP
81.29318	0	2.12875	0	2,12875	3NATU8-N: 8
160127.0	0	9869990	0	286999.0	5 : ISOBUTANE
E1117.1	0	130996	0	36906.1	4 : PROPANE
42414.0	0	763486.0	0	753485.0	3 : ETHANE
66830.0	0	97420.0	0	97460.0	2 : METHANE
526000.0	0	725000.0 0.0003249	0	72E000.0 647800.0	49 : CARBON DIOXIDE
0.000363	v	200000	U	2660000	MEDOGEN - SN
latoT % lov bta	Fiduid 2	Liquid 1 SCF/hr	SCE/MY Vapor	SCE/PL	Aught suggeduige
letoT	S birmi I	t binni I	youe/	lstoT	Component Name
					Flowrates
100	0	2454.E9	0	7454.69	IsloT
001	0	₹ \$\$\$		0 £477	
			0 0 0		A3TAW : \$2
60718.8 6837.84 0	0 0 0	0	0	0	
0 60716.9 6337.84 0	0 0 0 0	0 65.903.5 6595.34 0	0 0	1333.3 1 0	42: O.YYLENE 13: N.NONBNE 14: N.DECANE 62: WATER
0 0.51703 6.31703 0 0	0 0 0 0	47408.S 0 03608.2 1383.34 0	0 0 0 0	20,60474 0 5,90366 45,5651 0	## W-XYLENE 13. O.YUENE 14. O.YUENE 14. O.YUENE 14. O.YUENE 14. O.YUENE
0	0 0 0 0 0	\$10864.0 47403.5 0 63609.3 1636.34 0	0 0 0 0	210864.0 47403.2 0 6209.3 636.34 0	46: ETHYL BENZENE 43: M-XYLENE 13: M-NONANE 13: W-NONANE 14: W-DECANE
82100.7 868689.0 71787.2 0 6.317683 0	0 0 0 0 0	16843.9 210864.0 47408.2 0 08609.3 1686.34	0 0 0 0 0	16543.8 210854.0 47408.2 0 08509.3 1283.34	42: 4-OCTANE 45: ETHZ 42: O-XYLENE 43: M-XYLENE 14: N-DOLANE 14: N-DECANE 14: N-DECANE 15: WATEN
57526.1 88700.7 688884.0 71787.5 0 637.84 0	0 0 0 0 0 0	\$4008.1 Feed.3 \$10869.0 \$1404.5 0 \$3609.3 0	0 0 0 0 0 0	\$4008.1 1664.2.0 \$10864.0 \$7400.5 0 \$6609.2 1636.64	12. N-OCTBNE 46. ETHYL BENZENE 46. ETHYL BENZENE 64. N-XYLENE 64. N-VONANE 13. N-NONANE 14. N-DEGANE PROSENE 15. STATES 15. STATES 16. N-NONANE 16. N-STATES 16.
0 57326.1 0.07 683639.0 71787.2 0 6.31703 4.2663 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0	0 49008.1 18643.3 210864.0 47403.5 0 65009.8 1883.84	39: WETHYLCYCLOHEXAN 41: TOLUENE 45: ETHYL BENZENE 45: M-YCTENE 42: O-XYLENE 13: W-NONANE 13: W-NONANE 14: W-DECANE
16312.8 0 0 67526.1 0 63839.0 71787.2 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	28879.7 0 0 18008.1 18008.2 21088.4 0 0 57409.2 0 0 536.6 0 0 1568.3 0	11: H-HEPTANE 29: METHYLCYCLOHEXAN 41: TOLLENE 43: M-XYLENE 43: M-XYLENE 43: M-DOLANE 13: M-DECANE 14: N-DECANE 15: WATER
0 57326.1 0.07 683639.0 71787.2 0 6.31703 4.2663 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 49008.1 18643.3 210864.0 47403.5 0 65009.8 1883.84	M: 3-METHYLHEXANE 19 - METHYLCYCLOHEXAN 19 - METHYLCYCLOHEXAN 10 - M: M: M: M: M: M: M: M: M: M: M: M: M:
0 16915.8 0 57526.1 0 86100.7 71787.5 0 0 0 0 0	0 0 0 0 0 0 0 0	0 S2876.7 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 S2879.7 0 S2879.7 0 1008.1 0 17409.2 0 17409.2 0 17409.2 0 17509.2 0 0 0 0 0 0 0 0 0 0 0 0 0	79: 2-METHYLHEXANE 11: N-HEPTANE 13: N-HEPTANE 14: N-HEPTANE 14: N-CCTANE 14: N-CCTANE 14: N-CCTANE 15: N-CCTANE 16: N-CCTANE 17: N-CCTANE 17: N-CCTANE 18: N-NONANE 19: N-NON
0 16315.8 0 16315.8 0 16315.8 0 17187.2 0 17187.2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	0 22873.7 0 10808.1 0 10808.0 108	0 0 0 0 0 0 0 0	0 28873.7 0 0 0 1864.0 17603.2 0 17603.2 0 17603.3 0 0	M: 3-METHYLHEXANE 19 - METHYLCYCLOHEXAN 19 - METHYLCYCLOHEXAN 10 - M: M: M: M: M: M: M: M: M: M: M: M: M:
0 62051.1 62051.2 0 16205.3 0 16205.3 0 17887.2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0	0 62880.1 0 62880.7 0 628870.7 0 628870.7 510864.0 74400.5 610864.0 7460.2 0 7460.2 0 7460.2 0	0 0 0 0 0 0 0 0	0 62360.1 62360.1 0 0 52873.7 0 52873.7 0 15508.1 0 174603.2 174603.2 0 17362.34 36509.2 0	37: METHYLCYCLOPENTA 39: CYCLOHEXANE 39: CYCLOHEXANE 40: TALLENANE 40: TALLENANE 41: TALLENANE 42: M-CCTANE 43: M-CCTANE 43: M-CCTANE 43: M-CCTANE 43: M-COTANE 43: M-COTANE 44: M-DECANE 45: M-COTANE 45: M-COTANE 46: M-COTANE 47: M-COTANE 48: M-COTANE 48: M-COTANE 48: M-COTANE 49: M-COTANE
0 0007.7 57844.0 68869.4 0 0 16815.8 0 0 171787.2 68889.0 0 0 171787.2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 62391.7 0 0 6247.0 0 6230.1 0 623870.7 0 0 623870.7	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	95714.0 65360.1 90 0 52873.7 0 1556.3 1008.1 0 17403.2 1036.0 1536.3 103	10: 4-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 60: 39: METHYLCYCLOHEXANE 71: N-HEPTANE 73: M-YOLENE 73: M-YOLENE 74: N-OCTANE 73: M-YOLENE 73: M-YOLENE 73: M-NONANE 73: M-NONANE 74: M-DECANE 75: M-NONANE 75: M-NONANE 76: M-NONANE 77: M-NONANE 77: M-NONANE 78: M-NONANE
0 6007.7 0 62067.1 62067.1 0 16315.8 0 17187.2 683839.0 0 17187.2 0 0 0 6307.84 607.84	0 0 0 0 0 0 0 0 0 0 0	0 62961.7 0 0 62961.7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 62991.7 0 62991.7 0 62991.7 0 0 62991.7 0 0 0 62990.1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	63: 3-METHYLPENTANE 10: N.4HEXANE 37: N.4HEXANE 38: CYCLOPENTA 40: BENZENE 79: C.YCLOHEXANE 11: N.4HEPTANE 79: METHYLHEXANE 11: N.4HEPTANE 11: N.4HEPTANE 12: N.4HEPTANE 13: N.4NONANE 14: N.6CENE 14: N.4NONANE 14: N.4DECANE
0 6007.7 0 6007.7 0 6007.8 0 6007.8 0 6007.8 0 6007.8 0 0 6007.8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 92391.7 0 62392.7 623820.7 0 528870.7 0 528870.7 10068.0 17400.5 510068.0 17400.5 17508.0 17508	0 0 0 0 0 0 0 0 0 0	0 92991.7 0 92991.7 0 62950.1 90 90 90 90 90 90 90 90 90 90	62: 2-METHYLPENTAUE 53: 3-METHYLPENTAUE 10: N-HEXAUE 30: 0-METHYLPEXAUE 31: N-METHYLPEXAUE 32: N-GCTAUE 33: N-GCTAUE 34: N-GCTAUE 35: N-GCTAUE 36: THYLBEXAUE 37: N-GCTAUE 39: N-GCTAUE 31: N-METHYLPEXAUE 32: N-GCTAUE 33: N-METHYLPEXAUE 34: N-METHYLPEXAUE 35: N-GCTAUE 36: N-GCTAUE 37: N-GCTAUE 37: N-GCTAUE 38: N-GCTAUE 38: N-GCTAUE 39: N-GCTAUE 30: N-GCTAU
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 6299: 7 0 6299: 7 0 62930: 1 0 62930: 1 0 62909: 7 0 62909: 7 62909:	65: 3.40-00 TA WEDWITH WIGHT A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WEDWITH A WATTOLLENE A WATT
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Flowrates

Properties

Temperature	F	70								
Pressure	psia	14.7								
Enthalpy	Btu/hr	-575446.1								
Entropy	Btu/hr/R	-639.7209								
Vapor Fraction		0								
		Total	Liquid 1							
Flowrate	lbmol/hr	35.6675	35.6675							
Flowrate	lb/hr	4137.4836	4137.4836							
Mole Fraction		1	1							
Mass Fraction		1	1							
Molecular Weight	D. # 1	116.0014	116.0014							
Enthalpy	Btu/Ibmol	-16133.6115	-16133.6115							
Enthalpy	Btu/lb	-139.0812	-139.0812							
Entropy	Btu/lbmol/R	-17.9357	-17.9357							
Entropy	Btu/ib/R	-0.154616	-0.154616							
Cp Cp	Btu/lbmol/R Btu/lb/R		57.4199 0.495							
Cv	Btu/ibmol/R		50.5021							
Cv	Btu/lb/R		0.4354							
Cp/Cv	Dianoni		1,137							
Density	lb/ft3		44.2726							
Z-Factor	15/110		0.006777							
Flowrate (T-P)	gal/min		11.6522							
Flowrate (STP)	gai/min		11.5735							
Specific Gravity	GPA STP		0.714658							
Viscosity	cР		0.515961							
Thermal Conductivity	Btu/hr/ft/R		0.065866							
Surface Tension	dyne/cm		21.2374							
Reid Vapor Pressure (ASTM-A	psia		11.05							
True Vapor Pressure at 100 F	psia		19.47							
Criticai Temperature (Cubic E	F	599.2774								
Critical Pressure (Cubic EOS)	psia	431.1843								
Dew Point Temperature	F	308.9403								
Bubble Point Temperature	F.	69.9748								
	Water Dew Point Temperature could not be calculated									
Stream Vapor Pressure	psia	14.7								
Latent Heat of Vaporization (N	Btu/lb	129.9117								
Latent Heat of Vaporization (P	Btu/lb	259.9742								
CO2 Freeze Up	D+-100F	No coot or								
Heating Value (gross)	Btu/SCF	6307.05								
Heating Value (net) Wobbe Number	Btu/SCF Btu/SCF	5858.11 2964.64								
Average Hydrogen Atoms	DIU/SUP	2964.64 17.8461								
Average Carbon Atoms		8.1601								
Hydrogen to Carbon Ratio		2.187								
		2.107								

Summary

DESIGN II for Windows

SOLUTION REACHED

Simulation Result:

Problem: Project: Task:

MA 70:11

0: L L

21-1qA-92

By:

:jA

P Flash Gas

P Poliday at T-P

P D Dbliday at T-P

P D Dbliday at T-P

Produced Water

Details for Stream 1 Stream 1 (Strm 1)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 STEAM	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 STEAM	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Flowrates			•		·	
Component Name	Total lbmol/hr	Vapor Ibmol/hr	Liquid 1 lbmol/hr	Liquid 2 Ibmol/hr	Total mole %	K-Value
46: NITROGEN	0.0000902	0	0.00005769	0.00003251	0.00048	76.3973
49 : CARBON DIOXIDE	0.000235	0	0.00004809	0.000187	0.00125	10.619
2 : METHANE 3 : ETHANE	0.003948	0 0	0.002742	0.001207	0.02101	30.7589
4 : PROPANE	0.003911 0.006801	0	0.003622 0.0066 3 1	0.000289 0.00017	0.02081 0.03619	5.34955 1.50467
5 : ISOBUTANE	0.002368	ŏ	0.00236	0.00008167	0.0126	0.624209
6 : N-BUTANE	0.007502	0	0.007482	0.00001944	0.03992	0.468635
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	0.288569
7 : ISOPENTANE 8 : N-PENTANE	0.005222 0.007197	0	0.005217	0.000005086	0.02779	0.175808
54 : 2,2-DIMETHYLBUTA	0.007197	0	0.007192 0	0.000005542 0	0.0383 0	0.138973 0.07402
55 : 2,3-DIMETHYLBUTA	Ö	Ö	ő	Ö	0	0.054839
52 : 2-METHYLPENTANE	0	0	0	Ō	0	0.049715
53 : 3-METHYLPENTANE	0	0	0	0	0	0.044482
10 : N-HEXANE 37 : METHYLCYCLOPENTA	0.013807	0 0	0.013803	0.000003394	0.07347	0.044351
40 : BENZENE	0 0.000801	0	0 0.0008	0 1.816E-07	0 0.00426	0.032828 0.040916
38 : CYCLOHEXANE	0.002022	Ö	0.002022	0.000000376	0.01076	0.033541
79: 2-METHYLHEXANE	0	0	0	0	0	0.014751
80: 3-METHYLHEXANE	0	0	0	0	0	0.014682
11 : N-HEPTANE 39 : METHYLCYCLOHEXAN	0.014626	0	0.014625	0.000001183	0.07783	0.01459
41 : TOLUENE	0 0.003428	0	0 0.003427	0 2.169 E- 07	0 0.01 824	0.011357 0.011414
12: N-OCTANE	0.012437	Ö	0.012436	3.367E-07	0.06618	0.004883
45 : ETHYL BENZENE	0.000832	0	0.000832	2.128E-08	0.00443	0.00461
43 : M-XYLENE	0.00495	0	0.00495	1.065E-07	0.02634	0.003879
42 : O-XYLENE 13 : N-NONANE	0	0	0	0	0	0.001809
14 : N-DECANE	0.011213 0.086529	0	0.011213 0.086528	1.042E-07 2.729E-07	0.05967 0.46045	0.001677 0.000569
62 : WATER	18.6043	Ö	0.000177	18.6041	99	6.53687
Total	18.7922	0	0.186166	18.606	100	
Flowrates						
Component Name	Total	Vapor	Liquid 1	Liquid 2	Total	
Component Name	ib/hr	Ib/hr	lb/hr	lb/hr	mass %	
46 : NITROGEN	0.002527	0	0.001616	0.000911	0.00071	
49 : CARBON DIOXIDE 2 : METHANE	0.010338 0.063342	0 0	0.002117	0.008221	0.002903	
3 : ETHANE	0.117586	0	0.043985 0.108897	0.019357 0.008688	0.017787 0.033019	
4 : PROPANE	0.299879	ō	0.292403	0.007476	0.084209	
5 : ISOBUTANE	0.137617	0	0.137143	0.000475	0.038644	
6 : N-BUTANE	0.436007	0	0.434877	0.00113	0.122435	
9: 2,2-DIMETHYLPROP 7: ISOPENTANE	0 0.376772	0	0 0.376405	0 0.000367	0 0.105801	
8 : N-PENTANE	0.519264	ŏ	0.518864	0.0004	0.145815	
54: 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE 53 : 3-METHYLPENTANE	0 0	0	0	0	0	
10 : N-HEXANE	1.18974	0 0	0 1.18945	0.000293	0 0.334092	
37 : METHYLCYCLOPENTA	0	Ö	0	0	0	
40 : BENZENE	0.062529	0	0.062515	0.00001418	0.017559	
38 : CYCLOHEXANE 79 : 2-METHYLHEXANE	0.170167	0	0.170135	0.00003164	0.047785	
80 : 3-METHYLHEXANE	0 0	0	0	0 0	0 0	
11 : N-HEPTANE	1.46549	ő	1.46537	0.000119	0.411525	
39: METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE	0.315807	0	0.315787	0.00001998	0.088682	
12 : N-OCTANE 45 : ETHYL BENZENE	1.42057 0.088378	0	1.42053 0.088375	0.00003846 0.000002259	0.398909	
43 : M-XYLENE	0.525477	0	0.525466	0.000002239	0.024817 0.147559	
42 : O-XYLENE	0	o	0	0	0	
13 : N-NONANE	1.43811	0	1.43809	0.00001337	0.403834	
14 : N-DECANE 62 : WATER	12.3109	0	12.3109	0.00003882	3.45704	
VA. WAIEN	335.162	J	0.003187	335.159	94.1169	
Total	356.113	0	20.9061	335.207	100	

100	13375.3	10574.0	0	5.84852	IstoT
≯ 088.19	9£Y£. 2	60190000'0	0	38£Y£.3	62 : WATER
4.59818	848000000.0	0.268925	0	926892.0	14: N-DECANE
602919	762000000.0	349150.0	Ö	0.031945	13: N-NONANE
0 646200	0	0	0	0 031816	42: O-XALENE
628291.0	70-3680.2	869600.0	0	669600.0	43: M-XALENE
	4.155E-08	929100.0	0	0.001626	48: ETHYL BENZENE
7977.20.0		0.032219			
606099.0	3.676E-07 8.723E-07		0	0.03222	12 : N-OCTANE
61699313	0	808200.0	0	808500.0	41 : TOLUENE
0		0	0	0	39: METHYLCYCLOHEXAN
268683.0	S97S00000.0	0.034143	0	941460.0	11: N-HEPTANE
0	0	0	0	0	80: 3-METHYLHEXANE
0	0	0	0	0	79 : 2-METHYLHEXANE
74660.0	70-3974.8	S84E00.0	0	684500.0	38: CYCLOHEXANE
188910.0	2.571E-07	0.001133	0	D:001134	40: BENZENE
0	0	0	0	0	37: METHYLCYCLOPENTA
0.491232	690700000.0	627820.0	0	67820.0	10: N-HEXANE
0	0	0	0	0	53:3-METHYLPENTANE
0	0	0	0	0	52: 2-METHYLPENTANE
0	0	0	0	0	55 : 2,3-DIMETHYLBUTA
0	0	0	0	0	54: 2,2-DIMETHYLBUTA
0.225579	0.00001016	681510.0	0	6,013193	8: N-PENTANE
165384	24600000.0	£99600°0	Ō	£78600.0	7 : ISOPENTANE
0	0	0	0	0	9:2,2-DIMETHYLPROP
78840S.0	0.00003102	959110.0	ō	76110.0	6 : N-BUTANE
₽ 20780.0	0.00001352	906200.0	0	0.00392	5 : ISOBUTANE
0.16204	0.000236	142600.0	0	77 4 600.0	4 : PROPANE
94060.0	0.000391	668 1 00.0	0	0.00529	3:ETHANE
216730.0	0.001035	0.002352	Ö	785500.0	2 : METHANE
844600.0	91000.0	0.00004128	0	0.000202	49 : CARBON DIOXIDE
628000.0	1810000.0	0.00003211	Ö	12020000.0	46 : NITROGEN
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		7	, , , , , ,	
% lov bis	2CE\µ∟	SCF/hr	SCF/hr	SCF/hr	
IsloT	S biupi⊿	∤ biupi⊒	Vapor	Total	Component Name
					Flowrates
001	5.28733	394184.0	0	8897.3	Total Flowrates
					lstoT
4299.16	87882.3	784000.0	0	\$278S.2	F22 : WATER Total
31678.6 4233.19	87.754E-08 87.882.8	187822.0 784000.0	0	18782S.0 4278S.∂	14 : N-DECRNE 62 : WATER Total
7208.0 81978.6 4288.19	2.962E-08 2.9427.7 5.28578	920.0 187852.0 784000.0	0 0 0	620.0 187.522.0 427.82.3	et : w-wowane 14 : w-decane 62 : water Total
0 7208.0 81978.6 4288.19	0 80-32-90.2 80-34-37.7 85-38-38 85-38-38	0 620.0 187852.0 784000.0	0 0 0	0 620.0 187522.0 42782.3	92 : O-XYLENE 13 : N-NONANE 14 : N-DECANE 62 : WATER Total
0 0 7208.0 91978.6 4268.19	30.28-08 0 80.3596.0 80.348.08 81.885.8	108210.0 0 620.0 187822.0 784000.0	0 0 0 0	108210.0 0 620.0 1837522.0 42782.8	E43 : M-XYLENE 13-14-VO S P
1257,50.0 5091,52.0 0 7208.0 81978.5 \$238.19	6.9740.9 80-3320.5 0 80-3589.2 80-35437.7 87.885.8	621200.0 108210.0 0 620.0 187522.0 724000.0	0 0 0 0 0	621200.0 108210.0 0 00.029 187252.0 42785.3	45: ETHYL BENZENE 43: N-YVLENE 13: N-YVLENE 14: N-DECANE 62: WATER Total
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0.000.0 0.0	EMEODOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO	\$2100.0 \$2100.0 \$200.0 \$200.0 \$21710.0 \$2		861710.0 861710.0 861710.0 861710.0 861710.0 861710.0 86170.	2: METHANE 3: ETHANE 4: TOBUTANE 5: ISOBUTANE 6: NABUTANE 7: ISOPENTENE 7: SJUMETHYLBUTA 8: N-PENTENE 83: 3-METHYLBUTA 10: N-HEVANE 11: N-HEPTANE 11: N-HEPTANE 11: N-HEPTANE 12: N-OCTANE 13: N-OCTANE 14: N-OCTANE 15: N-OCTANE 16: N-OCTANE 17: N-OCTANE 18: N-OCTANE 18: N-OCTANE 18: N-OCTANE 19: N-METHYLBUTA 10: N-HEPTANE 11: N-HEPTANE 11: N-HEPTANE 12: N-HEPTANE 13: N-HONANE 14: N-HEPTANE 14: N-HEPTANE 15: N-HEPTANE 16: N-HEPTANE 16: N-HEPTANE 16: N-HEPTANE 17: N-HEPTANE 18: N-HEPTANE 19: N-HEPTANE 19: N-HEPTANE 19: N-HEPTANE 19: N-HEPTANE 10: N-HEPTANE 1
988851.0 987681.0 987681.0 988681	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	190700.0 396900.0 31710.0 601900.0 31710.0 601900.0 3810.0 60810.0 60800.0		\$25,000,000,000,000,000,000,000,000,000,0	49 : CARBON DIOXIDE 3 : METHANE 4 : PROPANE 6 : ISOBUTANE 6 : NAUTANE 7 : ISOBUTANE 9 : 22OIMETHYLPROP 7 : ISOPENTANE 8 : U.PENTANE 6 : 2OIMETHYLBUTA 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : NAFTHYLPENTANE
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050000.0 050	6000000 0 6000000 0 60000000 0 60000000 0 6000000	941000.0 190700.0 190700.0 30600.0 17170.0 30600.0 17170.0 1000.0		\$2,000.0 \$2,000	49 : CARBON DIOXIDE 3 : METHANE 4 : PROPANE 6 : ISOBUTANE 6 : NAUTANE 7 : ISOBUTANE 9 : 22OIMETHYLPROP 7 : ISOPENTANE 8 : U.PENTANE 6 : 2OIMETHYLBUTA 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : SOPENTANE 7 : NAFTHYLPENTANE

Flowrates

Properties

Temperature	F	85		
Pressure	psia	98.696		
Enthalpy	Btu/hr	-345246.5		
Entropy	Btu/hr/R	-549.6972		
Vapor Fraction		0		
·				
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18,7922	0.186166	18.606
Flowrate	lb/hr	356.1127	20.9061	335.2066
Mole Fraction	10/111	330.1127	0.009907	0.990093
Mass Fraction		i	0.058706	0.941294
Molecular Weight		18.95	112.2982	18.016
Enthalpy	Btu/lbmol	-18371.8148	-14752.178	-18408.0317
Enthalpy	Btu/lb	-969,4866	-131.3661	-1021,7584
Entropy	Btu/lbmol/R	-29.2514	-15.8869	-29.3851
	Btu/lb/R	-1.5436	-0.141471	-1.6311
Entropy Cp	Btu/lbmol/R	-1.0430	56.9172	17.9928
Ср	Btu/lb/R		0.5068	0.9987
Cy	Btu/lbmol/R		49.8785	17.7287
Cv	Btu/lb/R		0.4442	0.984
Cp/Cv	Blanbrit		1.1411	1.0149
Density	lb/ft3		43.4219	63.3981
Z-Factor	10/10		0.043675	0.004799
Flowrate (T-P)	gal/min		0.060031	0.659242
Flowrate (STP)	gal/min		0.058973	0.670194
Specific Gravity	GPA STP		0.708682	0.999863
Viscosity	cP		0.535142	0.807243
Thermal Conductivity	Btu/hr/ft/R		0.067989	0.355244
Surface Tension	dyne/cm		19.4988	71.2853
Reid Vapor Pressure (ASTM-A)	dynorom	unconverged	13.4300	7 1.2000
True Vapor Pressure at 100 F	psia	anconverged	73.11	
Critical Temperature (Cubic E	F	695.2244	70.11	
Critical Pressure (Cubic EOS	psia	3254.5678		
Dew Point Temperature	F	322.9413		
Bubble Point Temperature	, F	-120.2425		
Water Dew Point Temperature of	•			
Liquid 2 Freezing Point	F	31.9059		
Stream Vapor Pressure	psia	66.7783		
Latent Heat of Vaporization (I	Btu/lb	857.1977		
Latent Heat of Vaporization (I	Btu/lb	1091.036		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	60.65		
Heating Value (net)	Btu/SCF	56.32		
Wobbe Number	Btu/SCF	74.37		
Average Hydrogen Atoms	_	2.1521		
Average Carbon Atoms		0.0783		
Hydrogen to Carbon Ratio		27.4733		

Details for Stream 2 Stream 2 (Flash Gas)

	100	0	į.	0.356999 70049122.0	0.356999 Total VOC	Total
	37382.1	0 0	1893.0 101000.0	62400.0	69400.0	83.1 WEST AW
	0.121758 240325.0	0	28690.0	3£4000.0 31100.0	0.000435 91100.0	13: N-DECANE
	0	Ö	0	0	0	45 : O-XACENE
	0.114327	ŏ	0.02551	80+000.0	804000.0	43: W-XALENE
	0.022989	0	0.00429	70280000.0	70280000.0	49 : ETHYL BENZENE
	887975.0	0	96890.0	0.001356	0.001356	12: N-OCTANE
	458812.0	0	0.01531	187000.0	187000.0	A1: TOLUENE
	0	0	0	0	0	39 : METHYLCYCLOHEXAN
	1.26649	0 0	86070.0	122400.0	0.004521	80:3-METHYLHEXANE
	0	0	0 0	0	0 0	79: 2-METHYLHEXANE
	84886.0	ő	£02800.0	715100.0	715100.0	38 : CACLOHEXANE
	0.168355	0	800500.0	109000.0	109000.0	40 : BENZENE
	0	0	0	0	0	37: METHYLCYCLOPENTA
	£728£.£	0	12780.0	970210.0	970210.0	10: N-HEXANE
	0	0	0	0	0	53:3-METHYLPENTANE
	0	0	0	0	0	52 : 2-METHYLPENTANE
	0	0 0	0 0	0 0	0 0	55 : 2,3-DIMETHYLBUTA
	19688.4	0	75420.0	924710.0	924710.0	8: N-PENTANE
	4 52223	ő	12710.0	441610.0	441810.0	7 : ISOPENTANE
	0	0	0	0	0	9 : 2,2-БІМЕТНҮГРКОР
	13.8748	0	D7810.0	0.049533	6.049533	BNATU8-N: 8
	5.71748	0	89500.0	114020.0	0.020411	3 : ISOBUTANE
	4605.3S	0	88600.0	690160.0	690160.0	4 : PROPANE
	20.311	0	420200.0	13270.0	19270.0	3 : ETHANE
	1.16231 15.6883	0 0	920000.0 142000.0	641400.0 700330.0	641400.0 700930.0	49 : CARBON DIOXIDE 2 : METHANE
	480078.0	0	400 000.0	265200.0	265200.0	46 : NITROGEN
	7000200	ŭ	700000	555555	000000	1130032111 07
	wsss %	lb/hr	ent asem	lb/hr	lb/hr	
	IstoT	S biupi∃	I biupid Ineiqioni	vapor	1stoT	Component Name
						Flowrates
	001			110010:0	116010:0	
	100	0	Ł	715010.0	715010.0	Total
£486.7£	6969₽.2	0	99000.0	0.000255	992000.0	82: WATER
129100.0	990640.0	0	663784.0	921800000.0	921800000.0	14: N-DECANE
Z600.0	0.032852	0	371£30.0	686600000.0	68 ££00000.0	13: N-NONANE
418700.0	0	0	0	0	0	45 : O-XACENE
786310.0 78810.0	464700.0 6497260.0	0 0	788400.0 478720.0	70-3167.7 0.000003845	7.731E-07 0.000003845	43 : W-XAFENE 42 : ELHAF BENSENE
0.016432	990911.0	0	120070.0	78110000.0	78110000.0	12: N-OCTANE
0.04262	0.082123	ŏ		274800000.0		
0.051298	0				27. 12 8000000.0	41: TOLUENE
162630.0		0	0.019269	0	0 27 4 800000.0	33 : METHYLCYCLOHEXAN
£20990.0	9£Y£4.0					
	0 66764.0	0 0 0	0 631 <u>580</u> .0 0	0 0.00004512 0	0	39 : METHYLCYCLOHEXAN
669990.0	0	0 0 0	0 0 631S80.0 0	0 0 \$1840000.0 0	0 0 0.00004512 0	36 : S-METHYLHEXANE 11 : N-HEPTANE 12 : N-HEPTANE
941461.0	0.151666 0 0	0 0 0 0	30E110.0 0 0 631S30.0 0	59210000.0 0 0 \$1240000.0 0	0.00001565 0 0.0000000 0.00000000	38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 13: METHYLHEXANE
941461.0	989†20.0 999131.0	0 0 0 0	894400.0 808110.0 0 0 891580.0	39310000.0 39310000.0 0 0 \$1340000.0	66570000.0 66810000.0 0 0 51640000.0	40: BENZENE 10: A-METHYLHEXANE 10: 3-METHYLHEXANE 10: 3-METHYLHEXANE 10: METHYLHEXANE 10: SENZENE
01124099 941481.0	0 999121.0 999121.0	0 0 0 0 0 0	0 894400.0 908110.0 0 0 691580.0	0 26970000.0 29310000.0 0 0 21340000.0	0 86970000,0 83810000,0 0 0 \$1840000,0	37: METHYLCYCLOPENTA 40: BENZENE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 11: N-HEPTANE
896371.0 690431.0 646381.0 841461.0	4826.1 0 882470.0 888121.0 0	0 0 0 0 0 0	800770.0 0 884400.0 606110.0 0 0 681580.0	\$1000.0 0 8e3700000.0 8e310000.0 0 0 \$1840000.0	\$1000.0 \$8970000.0 \$8810000.0 0 \$1840000.0	38: WETHALCYCLOHEXAN 40: N-HEPTANE 37: AMETHYLHEXANE 38: CYCLOHEXANE 38: CYCLOHEXANE 38: CYCLOHEXANE 40: METHYLCYCLOPENTA 40: N-HEXANE
01124099 941481.0	0 999121.0 999121.0	0 0 0 0 0 0	0 894400.0 908110.0 0 0 691580.0	0 26970000.0 29310000.0 0 0 21340000.0	0 86970000,0 83810000,0 0 0 \$1840000,0	37: METHYLCYCLOPENTA 40: BENZENE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 11: N-HEPTANE
866371.0 866371.0 690431.0 646381.0 841461.0	0 \$836.1 0 983470.0 983121.0 0 0	0 0 0 0 0 0 0	0 800770.0 0 804110.0 0 0 691580.0 0	0 \$1000.0 \$26700000.0 \$3610000.0 0 \$1640000.0	0 \$1000.0 0 \$6870000.0 36810000.0 0 \$18\$\$0000.0	63:3-METHYLCYCLOHEXAN 10: N-HEPTANE 37: METHYLHEXANE 10: SENZENE 11: N-HEPTANE 10: SENZENE 11: N-HEPTANE 11: N-HEPTANE 12: N-HEPTANE 13: N-HEPTANE 14: N-HEPTANE 14: N-HEPTANE 15: N-HEPTANE 16: N-HEP
606036.0 186632.0 463362.0 466371.0 866371.0 646381.0 841461.0	0 0 0 0 0 9885.1 0 98870.0 0	0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 4+000.0 0 89870000.0 6 83810000.0 0 0 S1840000.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	64: 2,2-DIMETHYLBUTA 55: 3,3-DIMETHYLBUTA 65: 3,3-METHYLPEXANE 63: 3-METHYLPEXANE 79: 2-METHYLPEXANE 79: 2-METHYLPEXANE 79: 2-METHYLPEXANE 79: 2-METHYLPEXANE 79: 2-METHYLPEXANE 79: 2-METHYLPEXANE 79: 3-METHYLPEXANE 79: 3-METHYLPETHYNE 79: 3-METHYLPETHY
18863.0 60608.0 186632.0 468635.0 846371.0 860431.0 646381.0	82846.5 0 0 0 4886.1 0 888470.0 0 0	0 0 0 0 0 0 0 0	8719E0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	242000.0 0 0 0 0 0 41000.0 0 26310000.0 0 0 21240000.0	242000.0 0 0 0 0 0 0 0 0 26870000.0 0 21840000.0	8: M-PENTANE 54: 2,2-4)METHYLBUTA 55: 2,3-5)METHYLPEXANE 56: 2-METHYLPEXANE 70: 2-METHYLPEXANE 70: 3-METHYLPEXANE 70: 3-METHYLP
684077.0 18868.0 606086.0 188683.0 466851.0 866371.0 69081.0 646881.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	131850.0 871950.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$25000.0 \$2\$2000.0 0 0 \$1000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$25100000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 \$2510000.0 0 0 0 0 0 0 0 0 0 0 0 0 0	\$25000.0 \$45000.0 \$0 \$0 \$1000.0 \$2650000.0 \$2610000.0 \$1240000.0	7: ISOPENTANE 8: W-PENTANE 64: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2-METHYLPENTANE 10: N-HEXANE 10: N-HEXANE 10: N-HEYRNE 10: S-METHYLPENTANE 11: N-HEPTANE 11: N-HEPTANE 11: N-HEPTANE
86384.1 684077.0 13868.0 13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 871950.0 871950.0 0 800770.0 0 804110.0 834400.0 0 841730.0	0 S45000.0 0 0 0 0 0 41000.0 0 39810000.0 0 S1840000.0 0 S1840000.0	0 \$45000.0 \$45000.0 0 0 0 \$41000.0 0 \$6200000.0 0 \$6200000.0 0 \$1540000.0	9 : 2,2-DIMETHYLPROP 7 : ISOPEUTANE 8 : V.2-DIMETHYLEUTANE 54 : 2,2-DIMETHYLEUTANE 55 : 2-METHYLPEXANE 57 : AMETHYLPENTANE 38 : CYCLOHEXANE 37 : METHYLPENTANE 38 : CYCLOHEXANE 39 : AMETHYLPENTANE 40 : BENZENE 71 : N-HEXANE 72 : AMETHYLPENTANE 73 : AMETHYLPENTANE 74 : AMETHYLPENTANE 75 : AMETHYLPENTANE 76 : AMETHYLPENTANE 77 : AMETHYLPENTANE 78 : CYCLOHEXANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 70 : AMETHYLPENTANE 70 : AMETHYLPENTANE 71 : A
18684.1 8684.1 1886.0 984077.0 18868.0 90008.0 1866	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	604760.0 671960.0 671960.0 600770.0 600770.0 600770.0 60070.	288000.0 52000.0 545000.0 0 0 0 0 0 0 0 0 0 0 0 0 0	C28000.0 0 S45000.0 545000.0 0 0 0 0 0 0 0 0 0 0 0 0 0	6 : W-BUTANE 7 : Y-PUTANE 7 : Y-PUTANE 7 : SOPENTANE 8 : Y-PUTANE 64 : S.2-DIMETHYLEXANE 65 : S-METHYLEXANE 65 : S-METHYLPEXANE 67 : S-METHYLPENTANE 68 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 69 : S-METHYLPENTANE 60 : S-
86384.1 684077.0 13868.0 13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 871950.0 871950.0 0 800770.0 0 804110.0 834400.0 0 841730.0	0 S45000.0 0 0 0 0 0 41000.0 0 39810000.0 0 S1840000.0 0 S1840000.0	0 \$45000.0 \$45000.0 0 0 0 \$41000.0 0 \$6200000.0 0 \$6200000.0 0 \$1540000.0	9 : 2,2-DIMETHYLPROP 7 : ISOPEUTANE 8 : V.2-DIMETHYLEUTANE 54 : 2,2-DIMETHYLEUTANE 55 : 2-METHYLPEXANE 57 : AMETHYLPENTANE 38 : CYCLOHEXANE 37 : METHYLPENTANE 38 : CYCLOHEXANE 39 : AMETHYLPENTANE 40 : BENZENE 71 : N-HEXANE 72 : AMETHYLPENTANE 73 : AMETHYLPENTANE 74 : AMETHYLPENTANE 75 : AMETHYLPENTANE 76 : AMETHYLPENTANE 77 : AMETHYLPENTANE 78 : CYCLOHEXANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 79 : AMETHYLPENTANE 70 : AMETHYLPENTANE 70 : AMETHYLPENTANE 71 : A
70500.E F8805.C F8805.C F8805.0 F8805.0 F8605.	840413 60093 60093 600 600 600 7.16904 7.3684 600 600 600 600 600 600 600 60	0 0 0 0 0 0 0 0 0 0	604760.0 604760.0 871960.0 0 800770.0 0 80410.0 80410.0 80410.0 80410.0	728000.0 528000.0 452000.0 452000.0 545000.0 0 0 0 41000.0 0 286370000.0 0 36810000.0 0 212840000.0	\$28000.0 \$28000.0 \$45000.0 \$45000.0 \$0 \$0 \$1000.0 \$2810000.0 \$2810000.0 \$2810000.0 \$2810000.0	5: ISOBUTANE 6: N-BUTANE 9: A.SDIMETHYLPROR 7: ISOPENTANE 54: 2.SDIMETHYLPEXNE 55: 2.AMETHYLPEXNE 56: 2.AMETHYLPEXNE 10: N-HEPTANE 10: N-H
E8207.7 70200.5 70200.5 86384.1 13802.2 86307.0 864077.0 86207.0 84	20,0193 3,40613 0 0 0 0 0 0 0 0 0 0 0 0 0		686950.0 686250.0 604750.0 604750.0 604760.0 606770.0 606770.0 606770.0 606770.0 606770.0 606770.0	194500.0 214500.0 214500.0 28000.0 45000.0 45000.0 0 41000.0 0 41000.0 0 38070000.0 38070000.0 38070000.0 38070000.0 38070000.0 38070000.0	30000.0 30000.0 30000.0 30000.0 30000.0 30000.0 30000.0 300000.0 300000.0 300000.0 300000.0 300000.0 300000.0 300000.0 3000000.0 300000.0	4: PROPANE 5: IOBUTANE 6: N-BUTANE 6: N-BUTANE 7: ISOBUTANE 8: N-PENTANE 8: N-PENTANE 55: 2-APHTYLPEXANE 10: N-HEXANE 10:
8509.19 97.92.92 97.92.92 97.92.92 98.07.7 98.00.5 98.07.7 98.00.5 98.07.0 98.0 98.07.0 98.07.0 98.07.0 98.	6166160 6166160 6176.65 617	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	86100.0 86100.0 86820.0 86820.0 86820.0 871960.0 0 800770.0 0 806110.0 884400.0	82460000.0 194600.0 194600.0 2442000.0 456000.0 456000.0 456000.0 0 0 0 0 0 0 0 0 0 0 0 0 0	9249000.0 194600.0 214500.0 24500.0 145000.0 145000.0 145000.0 245000.0 245000.0 0 0 0 0 0 0 255000.0 0 0 0 0 0 0 255000.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	49 : CARBON DIOXIDE 2. METHANE 4. PROPANE 5. ISOBUTANE 6. NETHANE 6. NETHANE 7. S. PIMETHYLPRANE 7. S. PIMETHYLPRANE 6. S. PAMETHYLPRANE 79. S. PAMETHYLPRANE
219.591 6769.62 70200.5 8284.1 18802.5 70200.6 8284.1 18803.0 18808.0 984077.0 862871.0 847015.0 847015.0 847015.0 84881.0 84881.0	23,839 2,940413 6,000413		808700.0 808700.0 808700.0 808700.0 808700.0 871980.0 0 0 800770.0 0 808110.0 808110.0	194500.0 214500.0 214500.0 28000.0 45000.0 45000.0 0 41000.0 0 41000.0 0 38070000.0 38070000.0 38070000.0 38070000.0 38070000.0 38070000.0	164,600.0 211,5200.0 3000.0 38000.0 18000.0 528000.0 452000.0 545000.0 0 0 41000.0 28810000.0 28810000.0 213,40000.0	2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 7: ISOBUTANE 7: SA-PETHYLPEXANE 8: N-PENTANE 8: N-PENTANE 65: 2,3-DIMETHYLPENTANE 65: 2,3-DIM
880.808 8208.18 8208.18 8208.18 8208.18 8208.18 8208.18 8208.19 8208.19 8208.19 8208.10 820	% elow	00000000000000000000000000000000000000	6251000.0 841000.0 841000.0 841000.0 84100.0 84100.0 86250.0 86850.0 86850.0 871950.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	14/lomdl 9280000.0 92400000.0 92400000.0 194500.0 288000.0 185000.0 285000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 18500000.0 18500000.0	9249000.0 194600.0 214500.0 24500.0 145000.0 145000.0 145000.0 245000.0 245000.0 0 0 0 0 0 0 255000.0 0 0 0 0 0 0 255000.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	46: NITROGEN 49: CARBON DIOXIDE 2 : METHANE 5 : ISOBUTANE 6 : N-BUTANE 6 : N-BUTANE 7 : SAMETHYLPEXANE 7 : SAMETHYLPEXANE 6 : SAMETHYLPERANE 6 : SAMETHYLPERANE 7 : SAMETHYLPERANE 7 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 63 : SAMETHYLPENTANE 79 : SAMETHYLPENTANE 70 : SAMETHYLPENTANE
8509.19 97.92.92 97.92.92 97.92.92 98.07.7 98.00.5 98.07.7 98.00.5 98.07.0 98.0 98.07.0 98.07.0 98.07.0 98.	6167738 0 619619 0 619619 0 628.62 62610 0 626		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9280000.0 9280000.0 9280000.0 198500.0 515500.0 538000.0 152000.0 528000.0 525000.0 0 525000.0 0 545000.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	96280000.0 96280000.0 96280000.0 9628000.0 962800.0 962800.0 962800.0 962800.0 9628000.0 96280000.0 96280000.0 96280000.0 96280000.0 96280000.0 96280000.0 96280000.0	49: CARBON DIOXIDE 2. METHANE 5. METHANE 6. N-BUTANE 79: S-METHYLPEXANE 70: SHOTANE 71: N-HEPTANE 73: S-PIMETHYLPROTA 74: S-PIMETHYLPROTA 75: S-PIMETHYLPROTA 76: S-AMETHYLPROTA 76: S-AMETHYLPROTA 77: S-PIMETHYLPROTA 78: S-AMETHYLPROTA 79: S-AMETHYLPROTA 70: N-HEPTANE 71: N-HEPTANE 73: S-METHYLPROTA 74: S-PIMETHYLPROTA 75: S-PIMETHYLPROTA 76: S-PIMETHYLPROTA 76: S-PIMETHYLPROTA 79: S-PIMETHYLPROTA 70: S-PIMETHYLPROTA 70: S-PIMETHYLPROTA 70: S-
C.134146 0.134146 0.134146 0.176398 0.166949 0.210746 0.210746 0.210746 0.210746 0.210746 0.2007 7.20861 7.48638 0.770748 7.70863 7.70863 7.70864 7.48638 0.770746 0.210746 0.210746 0.210746		Liquid 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	thinpil insignal sail from the sail form shifted to the sail form the sa	14/lomdi 98280000.0 98280000.0 98280000.0 98280000.0 1828000.0 1828000.0 1828000.0 1828000.0 1828000.0 1828000.0 1828000.0 1828000.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Initional lesson and l	46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 5: ISOBUTANE 6: N-BUTANE 6: N-BUTANE 7: SAMETHYLPEXANE 7: SAMETHYLPEXANE 61: SAMETHYLPERANE 62: 2-METHYLPENTANE 63: 3-METHYLPENTANE 64: N-BUTANE 65: 2-METHYLPENTANE 65: 2-METHYLPENTANE 66: 3-METHYLPENTANE 66: 3-METHYLPENTANE 67: 3-METHYLPENTANE 68: 3-METHYLPENTANE 69: 3-METHYLPENTAN
880.808 8208.18 8208.18 8208.18 8208.18 8208.18 8208.18 8208.19 8208.19 8208.19 8208.10 820	% elow	00000000000000000000000000000000000000	6251000.0 841000.0 841000.0 841000.0 84100.0 84100.0 86250.0 86850.0 86850.0 871950.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	14/lomdl 9280000.0 92400000.0 92400000.0 194500.0 288000.0 185000.0 285000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 185000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 1850000.0 18500000.0 18500000.0	74/lomdi 96280000.0 9580000.0 958000.0 194500.0 528000.0 528000.0 528000.0 525000.0 525000.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Component Name 46: NITROGEN 29: CARBON DIOXIDE 20: METHANE 30: ETHANE 40: CARBON DIOXIDE 30: METHANE 50: SAPENTANE

Flowrates

Total

Component Name	Total	Vapor	Liquid 1	Liquid 2	Total
	ft3/hr	ft3/hr	ft3/hr	ft3/hr	volume %
46 : NITROGEN	0.032712	0.032712	0	0	0.827733
49 : CARBON DIOXIDE	0.036118	0.036118	0	0	0.913919
2 : METHANE	1.33732	1.33732	0	0	33.839
3 : ETHANE	0.923782	0.923782	0	0	23.3751
4 : PROPANE 5 : ISOBUTANE	0.791159	0.791159	0	0	20.0193
6 : N-BUTANE	0.134531 0.326471	0.134531 0.326471	0 0	0 0	3.40413 8.26093
9: 2,2-DIMETHYLPROP	0	0.525471	Ö	0	0.20093
7: ISOPENTANE	0.08572	0.08572	0	Ö	2.16904
8 : N-PENTANE	0.092684	0.092684	0	0	2.34525
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA 52 : 2-METHYLPENTANE	0 0	0 0	0 0	0	0 0
53 : 3-METHYLPENTANE	0	0	0	0 0	0
10 : N-HEXANE	0.053684	0.053684	Ö	Ö	1. 3 584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.002948	0.002948	0	0	0.074586
38 : CYCLOHEXANE	0.005994	0.005994	0	0	0.151666
79: 2-METHYLHEXANE 80: 3-METHYLHEXANE	0 0	0 0	0 0	0 0	0 0
11 : N-HEPTANE	0.017286	0.017286	0	0	0.43739
39: METHYLCYCLOHEXAN	0	0	Ö	Ö	0
41 : TOLUENE	0.003245	0.003245	0	0	0.082123
12 : N-OCTANE	0.004547	0.004547	0	0	0.115056
45 : ETHYL BENZENE	0.000296	0.000296	0	0	0.007494
43: M-XYLENE 42: O-XYLENE	0.001473 0	0.001473 0	0	0 0	0.037266
13 : N-NONANE	0.001298	0.001298	0	0	0 0.032 8 52
14 : N-DECANE	0.003124	0.003124	Ö	Ö	0.079056
62 : WATER	0.097602	0.097602	0	Ō	2.46969
Flowrates	Total	Vone	4 استنجا	Limited O	T-4-1
Flowrates Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
	SCF/hr	SCF/hr		SCF/hr	std vol %
Component Name		•	SCF/hr		
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE	SCF/hr 0.032406	SCF/hr 0.032406	SCF/hr	SCF/hr	std vol % 0.827733
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE	SCF/hr 0.032406 0.03578 1.3248 0.915139	SCF/hr 0.032406 0.0357 8 1.3248 0.9151 3 9	SCF/hr 0 0 0 0	SCF/hr 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757	SCF/hr 0 0 0 0 0	SCF/hr 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272	SCF/hr 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757	SCF/hr 0 0 0 0 0	SCF/hr 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416	SCF/hr 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817	SCF/hr 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 2.16904 2.34525
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLBUTA	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 53: 3-METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 50: 3-METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2: 2-METHYLPENTANE 10: N-HEXANE 10: N-HEXANE 37: METHYLCOLOPENTA 40: BENZENE 38: CYCLOHEXANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.00292 0.005938	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 10: N-HEXANE 37: METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 10: N-HEXANE 37: METHYLPENTANE 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.00292 0.005938 0 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666 0
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 10: N-HEXANE 37: METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666
Gomponent Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 10: N-HEXANE 37: METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 39: METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0 0.017124 0 0 0.003215	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0 0.017124	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666 0 0 0.43739
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 62: 2-METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCL OHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 11: N-HEPTANE 39: METHYLCYCLOHEXAN 11: TOLUENE 12: N-OCTANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0 0.017124 0 0.003215 0.004504	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0.017124 0 0.003215 0.004504	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666 0 0 0.43739 0 0.082123 0.115056
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 84: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 3-METHYLPENTANE 10: N-HEXANE 17: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEYANE 10: 3-METHYLHEXANE 11: N-HEPTANE 10: 3-METHYLHEXANE 11: N-HEPTANE 10: 3-METHYLHEXANE 11: N-HEPTANE 11: N-HEPTANE 11: N-HEPTANE 12: N-OCTANE 14: TOLUENE 12: N-OCTANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0 0.00292 0.005938 0 0.017124 0 0.003215 0.004504 0.000293	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.00292 0.005938 0 0.0017124 0 0.003215 0.003215 0.000293	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666 0 0 0.43739 0 0.082123 0.115056 0.007494
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 8: N-PENTANE 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 60: 3: 3-METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.0053182 0 0.005938 0 0.017124 0 0.003215 0.004504 0.000293 0.001459	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.005938 0 0.00292 0.005938 0 0 0.017124 0 0.003215 0.004504 0.000293 0.001459	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666 0 0 0.43739 0 0.082123 0.115056 0.007494
Gomponent Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 53: 3-METHYLPENTANE 10: N-HEXANE 37: METHYLPENTANE 10: N-HEXANE 39: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 39: METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 42: O-XYLENE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.00292 0.005938 0 0 0.017124 0 0 0.003215 0.004504 0.000293 0.001459 0	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0 0.0171124 0 0.003215 0.004504 0.000293 0.001459 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.639 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0.074586 0.151666 0 0 0.43739 0 0.082123 0.115056 0.007494 0.037266 0
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 8: N-PENTANE 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 50: 2-METHYLPENTANE 10: N-HEXANE 37: METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.0053182 0 0.005938 0 0.017124 0 0.003215 0.004504 0.000293 0.001459	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0.053182 0 0.005938 0 0.00292 0.005938 0 0 0.017124 0 0.003215 0.004504 0.000293 0.001459	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.839 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0 0.074586 0.151666 0 0 0.43739 0 0.082123 0.115056 0.007494 0.037266 0 0 0.032852
Component Name 46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 65: 2,3-DIMETHYLBUTA 60: 3-METHYLPENTANE 60: N-HEXANE 60: N-HEXANE 79: 2-METHYLCYCLOPENTA 40: BENZENE 80: 3-METHYLLEXANE 11: N-HEPTANE 12: N-OCTANE 41: TOLUENE 12: N-OCTANE 43: M-XYLENE 44: O-XYLENE 44: N-NONANE	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0.0017124 0 0.003215 0.004504 0.000293 0.001459 0 0.001286	SCF/hr 0.032406 0.03578 1.3248 0.915139 0.783757 0.133272 0.323416 0 0.084918 0.091817 0 0 0 0.053182 0 0.00292 0.005938 0 0.0017124 0 0.003215 0.004504 0.000293 0.001459 0 0.001286	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.827733 0.913919 33.639 23.3751 20.0193 3.40413 8.26093 0 2.16904 2.34525 0 0 0 1.3584 0.074586 0.151666 0 0 0.43739 0 0.082123 0.115056 0.007494 0.037266 0

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dl/uta

Btu/lbmol

JU/QI

lbmol/hr

Btu/hr/R

Ptu/hr

Bfn/SCF

Average Hydrogen Atoms Average Carbon Atoms Hydrogen to Carbon Ratio Methane Number Motor Octane Number

> Heating Value (gross) Heating Value (net)

Stream Vapor Pressure Vapor Sonic Velocity CO2 Freeze Up

Bubble Point Temperature

Viscosity
Thermal Conductivity
Critical Temperature (Cubic EOS
Dew Point Temperature
Bubble Soint Temperature

Water Dew Point

Flowrate (STP)

Cp/Cv Density Z-Factor Flowrate (T-P)

CA Cb Cb

Entropy

Entropy

Enthalpy

Molecular Weight Enthalpy

Flowrate

Enthalpy

Properties Temperature

Flowrate Mole Fraction Mass Fraction

Entropy Vapor Fraction

Морре Иитрег

EFSCOP00005498

Details for Stream 3 Stream 3 (Produced Water)

•		•				
Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc: Liquid 2 Visc:	NBS81 STEAM	Liquid 1 ThC: Liquid 2 ThC:	NBS81 STEAM	Liquid 1 Den: Liquid 2 Den:	STO STD
Flowrates						
Component Name	Total	Vapor	Liquid 1	Liquid 2	Total	K-Value
	lbmol/hr	lbmol/hr	lbmol/hr	lbmol/hr	mole %	
46 : NITROGEN	0.000004808	0	0.00000000	0.000004000	0.0000050	
49 : CARBON DIOXIDE	0.000141	0	0.000002902 0.00002632	0.000001906 0.000114	0.0000256 0.000749	
2 : METHANE	0.000457	Ō	0.00031	0.000148	0.002434	
3: ETHANE	0.001499	0	0.001385	0.000114	0.007982	
4 : PROPANE	0.004736	0	0.004612	0.000124	0.025213	
5 : ISOBUTANE	0.002017	0	0.002011	0.000005233	0.010737	
6 : N-BUTANE 9 : 2,2-DIMETHYLPROP	0.00 6 65 0	0 0	0.006637 0	0.0000127 0	0.035404 0	
7 : ISOPENTANE	0.004999	ő	0.004995	0.000003334	0.026614	
8 : N-PENTANE	0.006955	0	0.006952	0.000003605	0.037033	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	Q	
52 : 2-METHYLPENTANE 53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.013666	0	0 0.013 664	0 0.000002088	0 0.072764	
37 : METHYLCYCLOPENTA	0.010050	ő	0.515004	0.000002000	0.072704	
40 : BENZENE	0.000793	0	0.000793	1.147E-07	0.004221	
38 : CYCLOHEXANE	0.002006	0	0.002006	2.332E-07	0.010683	
79 : 2-METHYLHEXANE	0	O	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11: N-HEPTANE 39: METHYLCYCLOHEXAN	0.014581 0	0 0	0.01458 0	6.724E-07 0	0.077633	
41 : TOLUENE	0.003419	0	0.003419	1.262E-07	0 0.018205	
12 : N-OCTANE	0.012425	ő	0.012425	1.769E-07	0.066153	
45 : ETHYL BENZENE	0.000832	0	0.000832	1.152E-08	0.004428	
43: M-XYLENE	0.004946	0	0.004946	5.729E-08	0.026334	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE 14 : N-DECANE	0.01121	0	0.01121	5.05E-08	0.059685	
62 : WATER	0.08652 18.604	0 0	0.08652 0.000115	1.215E-07 18.6039	0.46066 99.053	
		-	0.000110	10.0003	00.000	
Total	18.7819	0	0.177442	18.6044	100	
Flowrates						
Component Name	Total	Vapor	Liquid 1	Liquid 2	Total	
	lb/hr	lb/hr	lb/hr	lb/hr	mass %	
46 : NITROGEN	0.000135	0	0.0000813	0.00005338	0.00003786	
49 : CARBON DIOXIDE 2 : METHANE	0.006188 0.007334	0 0	0.001159	0.00503	0.001739	
3 : ETHANE	0.045075	0	0.004968 0.041657	0.002367 0.003418	0.002062 0.01267	
4 : PROPANE	0.20881	Ö	0.203345	0.005465	0.058695	
5: ISOBUTANE	0.117206	0	0.116902	0.000304	0.032946	
6 : N-BUTANE	0.386474	0	0.385736	0.000738	0.108635	
9: 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE 8 : N-PENTANE	0.360627 0.501808	0 0	0.360387	0.000241	0.101369	
54 : 2,2-DIMETHYLBUTA	0.501606	0	0.501548 0	0.00026 0	0.141054 0	
55 : 2,3-DIMETHYLBUTA	Ö	ő	Ö	0	0	
52: 2-METHYLPENTANE	0	0	0	0	Ō	
53: 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	1.17767	0	1.17749	0.00018	0.331033	
37 : METHYLCYCLOPENTA 40 : BENZENE	0 0.061928	0 0	0	0 00000000	0	
38 : CYCLOHEXANE	0.16885	0	0.061919 0.16883	0.000008956 0.00001962	0.017407 0.0474 6 2	
79 : 2-METHYLHEXANE	0	ő	0	0.00001902	0.041402	
80: 3-METHYLHEXANE	0	0	Ō	0	ō	
11: N-HEPTANE	1.46097	0	1.4609	0.00006737	0.410667	
39 : METHYLCYCLOHEXAN	0	0	0	0	0	
41 : TOLUENE 12 : N-OCTANE	0.315027	0	0.315015	0.00001163	0.088551	
45 : ETHYL BENZENE	1.41921 0.088295	0	1,41919 0.088294	0.0000202 0.000001223	0. 3 98928 0.024819	
43 : M-XYLENE	0.525069	0	0.525063	0.000001223	0.024819	
42 : O-XYLENE	0	ő	0	0	0	
13: N-NONANE	1.43767	0	1.43766	0.000006477	0.404117	
14: N-DECANE	12.3098	0	12.3098	0.00001729	3.46018	
62 : WATER	335.158	0	0.002078	335.156	94.21	
Total	355.756	0	20.582	335.174	100	

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Total	5.83586	0	227194.0	\$1\$75.3	100
62: WATER	73575.3	0	26660000.0	£3573.8	3870.29
14: N-DECANE	0.2689	0	6892.0	3.777E-07	4.60772
13: N-NONANE	969160.0	0	0.031935	1.439E-07	0.547229
45 : O-XAFENE	0	0	0	0	0
43 : W-XALENE	169600.0	0	169600'0	1.122E-07	90991.0
12 : N-OCTANE	\$29100.0	0	\$29100:0	2.25E-08	168720.0
41: TOLUENE	₽67300.0 6812£0.0	0	981260.0	Z:139E-07 4:582E-07	282660.0 773133.0
39: METHYLCYCLOHEXAN	0	Ö	0	0	0
11 : N-HEPTANE	40450.0	Ö	0.034039	72100000.0	962883.0
80: 3-METHYLHEXANE	0	0	0	0	0
79 : 2-METHYLHEXAUE	0	0	0	0	0
38 : CACTOHEXVIE	954500.0	0	0.003455	4.016E-07	0.059215
40 : BENZENE	0.001123	0	521100.0	1.624E-07	752910.0
37: METHYLCYCLOPENTA 10: U-HEXANE	85 4 820.0 0	0	0.028434 0	0.000004345	£₹8 ≯ .0 0
53:3-METHYLPENTANE	0	0	0	0 000001346	0
52: 2-METHYLPENTANE	Ö	ő	Ö	ŏ	Ö
55: 2,3-DIMETHYLBUTA	Ö	Ö	Õ	ō	ő
54: 2,2-DIMETHYLBUTA	0	0	0	0	0
8: N-PENTANE	0.01275	0	0.012743	609900000.0	69481S.0
7: ISOPENTANE	822600.0	0	0.009252	87 h800000.0	1158641
9 : 2,2-DIMETHYLPROP	0	0	0	0	0
BNATUR-N: 8	19010.0	0	0.01059	0.00002026	908181.0
4: PROPANE 5: ISOBUTANE	665800.0 0.003339	0	0.006426 0.00333	£71000.0 \$3800000.0	870811.0 702720.0
3: ETHANE	0.002028	0	478100.0 351300.0	P21000.0	847450.0
2 : METHANE	262000.0	Ö	0.000266	721000.0	27900.0
49 : CARBON DIOXIDE	0.000121	0	0.0000226	11860000.0	890200.0
46: NITROGEN	0.000002676	0	818100000.0	180100000.0	0.00004586
	2CE/PC	SCF/hr	SCF/hr	SCF/hr	% lov bts
Component Name	lstoT	Vapor	t biupid 1 SC≡/br	S biupid SCE/br	latoT
	1-4-7	/(V P:: 1	Chinail	IOIOT
Flowrates					
Total	5,84445	0	687484.0	99675.3	100
62 : WATER	18675.3	0	206000.0	13675.3	6640.26
14: N-DECANE	0.22663	0	0.22663	3.514E-08	7778.£
13: N-NONANE	0.029363	Ö	636920.0	80-∃9⊅.↑	804208.0
42 : O-XYLENE	0	0	0	0	0
43: W-XACENE	0.012955	0	0.012955	80-∃739.1	78152.0
42 : ETHAT BENZENE	971200.0	0	971200.0	3.331 E-09	972720.0
12 : N-OCTANE	0.032545	0	0.032545	80-3211.2	628933.0
41: TOLUENE	996800.0	0	926800.0	3.651 E-08	0.153239
11: N-HEPTANE	0.038191	0	191860.0 0	1.944 E -07	653463 0
80:3-METHYLHEXANE	0	Ö	0	0	0
79: 2-METHYLHEXANE	Ö	Ö	Ö	ő	Ď
38 : CACTOHEXVIE					
	0.005255	0	0.005255	80-∃Z ≯ 7.9	416680.0
40 : BENZENE	770200.0 882800.0	0 0	0.002076 0.005255		-
40: BENZENE	0.002077	0 0	0 0.002076	9'312E-08 9'312E-08 0	\$16680.0
10: N-HEXPNE 37: METHYLCYCLOPENTA 40: BENZENE	0,035793 770200.0	0 0 0	267350.0 0 870200.0	6.038E-07 3.315E-08 6.742E-08	0.089914 0.09653 0.09914
63: 3-METHYLCYCLOPENTA 37: METHYLCYCLOPENTA 40: BENZENE	0 697780.0 0 770200.0	0 0 0	0 267360.0 0 370200.0	0 6.038E-07 0 80-3315.6 80-3547.8	0 6.0142 0 6.0360 0 0 0 0
S2: 2-METHYLPENTANE 53: 3-METHYLPENTANE 37: METHYLPENTA 40: BENZENE	0 0 697380.0 0 770200.0	0 0 0 0	0 0 297380.0 0 370200.0	0 6.038E-07 6.038E-07 80-321-08 80-3247.8	0 0.64218.0 0.03650.0 \$16980.0
55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 30: 3-METHYLPENTANE 31: METHYLPENTANE 37: METHYLPENTANE 37: METHYLPENTANE	0 0 0 697860.0 0 770200.0	0 0 0 0 0	0 0 0 267350.0 0 370200.0	0 6.038E-07 6.038E-07 80-336F 80-3247,8	0 0 0.034216.0 0.03563 416680.0
54: 2,2-DIMETHYLBUTA 56: 2,3-DIMETHYLBUTA 53: 3-METHYLPEUTANE 10: N-HEXANE 37: METHYLPEUTANE 37: METHYLPEUTANE 37: METHYLPEUTANE	0 0 0 697860.0 0 770200.0	0 0 0 0 0	0 0 0 297360.0 0 370200.0	6,742E-08 6,038E-07 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 534260.0 5360.0 \$16680.0
55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 30: 3-METHYLPENTANE 31: METHYLPENTANE 37: METHYLPENTANE 37: METHYLPENTANE	0 0 0 697860.0 0 770200.0	0 0 0 0 0	0 0 0 267350.0 0 370200.0	0 6.038E-07 6.038E-07 80-336F 80-3247,8	0 0 0.034216.0 0.03563 416680.0
8 : N-PENTANE 64 : 2,3-DIMETHYLBUTA 65 : 2,3-DIMETHYLBUTA 63 : 3-METHYLPENTANE 63 : 3-METHYLPENTANE 70 : WETHYLPENTANE 70 : BENZENE	0 0 0 0 0 0 697860.0 0 770200.0	0 0 0 0 0 0	15810.0 0 0 0 0 0 267860.0 0 570500.0	0.00000000 0 0 0.038E-07 0.3316E-08 6.742E-08	0 0 0 0 0 0 524216.0 0 6360.0 \$1660.0
6 : N-BUTANE 6 : N-BUTANE 7 : ISOPENTANE 8 : N-PENTANE 56 : 2,3-DIMETHYLBUTA 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 10 : N-HEXANE 37 : METHYLPENTANE 10 : N-HEXANE 10 : N-HEXANE 11 : METHYLPENTANE	886510.0 0 880610.0 0 115810.0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	286710.0 0 0 180610.0 15310.0 0 0 0 207360.0 0	0.0000000.0 5.015E-07 0.00000104 0 0 0.00000104 0 0.00000104 0 0.00000104 0 0 0 0 0 0 0 0 0 0 0 0 0	0 928952.0 0 928715.0 0 0 0 524516.0 0 0 54516.0 0 0 6360.0 0
6 : NSOBUTANE 6 : N-BUTANE 9 : C. N-BUTANE 7 : ISOPENTANE 7 : ISOPENTANE 8 : U-PENTANE 65 : C. D-DIMETHYLBUTA 65 : C. D-DIMETHYLBUTA 65 : C. D-DIMETHYLBUTA 65 : C. D-DIMETHYLBUTA 65 : D-METHYLBUTA 65 : D-METHYLBUTA 67 : METHYLBUTA 78 : METHYLBUTA 79 : METHYLBUTA 70 : N-METHYLBUTA 71 : N-METHYLBUTA 7	52500.0 885710.0 0 0 115810.0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	695200.0 695200.0 0 0 15810.0 0 0 0 267360.0 0	\$19100000.0 \$200000.0 \$400000.0 \$0.0000.0	716762.0 716762.0 683115.0 0 0 0 0 0 0 0 0 0 0 0 0 0
4 : PROPANE 6 : ISOBUTANE 6 : N-BUTANE 9 : X.2-DIMETHYLPROP 7 : ISOPENTANE 54 : X.2-DIMETHYLBUTA 56 : X.2-DIMETHYLBUTA 56 : X.2-DIMETHYLBUTA 56 : X.3-DIMETHYLBUTA 57 : X-METHYLPENTANE 58 : X-METHYLBUTA 51 : N-HEXANE 71 : METHYLPENTANE 72 : METHYLPENTANE 73 : METHYLPENTANE 74 : METHYLPENTANE 75 : METHYLPENTANE 76 : METHYLPENTANE 77 : METHYLPENTANE	3H1S10.0 5Z260.0 5885710.0 0 888510.0 0 H1S810.0 0 0 0 0 0 0 0 687260.0 0 770200.0	0 0 0 0 0 0 0 0 0	80\$10.0 80\$200.0 80\$200.0 0 1\$80\$10.0 1\$810.0 0 0 0 0 0 20\$260.0 0	\$60000.00 \$6000.00 \$60000.00 \$60000.00 \$600000.00 \$600000.00 \$600000.00 \$600000.00 \$6000000.00 \$60000000000	962702.0 5717080.0 571762.0 571762.0 68252.0 0 0 0 0 0 0 0 0 0 0 0 0 0
3 : ETHANE 4 : PROPANE 5 : ISOBUTANE 6 : N-BUTANE 9 : 2,2-DIMETHYLPROP 7 : ISOPENTANE 8 : N-PENTANE 56 : 2,2-DIMETHYLBUTA 56 : 2,2-DIMETHYLBUTA 56 : 2,3-DIMETHYLBUTA 56 : 3,3-METHYLPENTANE 37 : METHYLPENTANE 37 : METHYLPENTANE 37 : METHYLPENTANE 40 : BENZENE 40 : BENZENE	29800.0 281510.0 52800.0 885710.0 0 880610.0 0 115810.0 0 0 0 0 0 0 0 587280.0 0 770200.0	0 0 0 0 0 0 0 0 0 0 0	928500.0 80510.0 952500.0 885710.0 0 886510.0 0 15810.0 0 0 0 0 0 0 207360.0 0 370500.0	0.00003684 0.000003684 0.000000.0 0.00000000.0 0.00000000000	95350.0 962702.0 962702.0 0 0 0 0 0 0 0 0 0 0 0 0 0
2 : METHANE 3 : ETHANE 4 : PROPA WE 5 : 1SOBUTANE 6 : W-BUTANE 7 : 1SOPENTANE 7 : 1SOPENTANE 7 : S.A-DIMETHYLPROP 52 : 2,A-DIMETHYLBUTA 52 : 2,A-DIMETHYLBUTA 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 54 : S.A-DIMETHYLPENTANE 55 : 3-METHYLPENTANE 56 : 3-METHYLPENTANE 57 : 3-METHYLPENTANE 57 : 3-METHYLPENTANE 58 : 3-METHYLPENTANE 59 : 3-METHYLPENTANE 59 : 3-METHYLPENTANE 50 : 3-METHYLPE	\$2800.0 \$2800.0 \$11210.0 \$2800.0 \$86510.0 \$80610.0 \$0 \$115810.0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	0 0 0 0 0 0 0 0 0 0	F18000.0 F18000.0 G28600.0 60510.0 G386710.0 G386710.0 G15810.0 G1000.0 0.00004287 0.00003887 0.000001513 0.000001043 0.000001043 0.000001043 0.000001043 0.000001043 0.000001043 0.000001043 0.0000043 0.0000043 0.000044 0.000044 0.000044 0.000044 0.000044 0.00004 0.00	809410.0 808416.0 90.0 0.0 0.0 0.0 0.0 0.0 0.0	
49 : CARBON DIOXIDE 3 : METHANE 4 : PROPANE 6 : ISOBUTANE 6 : N-BUTANE 9 : 22-DIMETHYLPROP 7 : ISOPENTANE 8 : N-PENTANE 56 : 2,3-DIMETHYLBUTA 56 : 2,3-DIMETHYLBUTA 57 : 2,3-DIMETHYLBUTA 70 : N-PENTANE 58 : A-PENTANE 59 : A-PENTANE 10 : N-HEXANE 10 : N-HEXANE 10 : N-HEXANE 11 : NENTAYLONIANE 12 : N-BUTANE 13 : N-BUTANE 14 : N-BUTANE 16 : N-BUTANE 17 : N-BUTANE 18 : N-BUTANE 19 : N-BUTANE 10 : N-BUTA	\$201000.0 \$28000.0 \$211510.0 \$3800.0 \$380510.0 \$380510.0 \$380510.0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	0 0 0 0 0 0 0 0 0 0 0	8088000.0 118000.0 92800.0 80510.0 92800.0 80510.0 0 15810.0 0 0 0 0 0 0 0 0 20780.0 0	30550000.0 30550000.0 50550000.0 5050000.0 50500000.0 50500000.0 50500000.0 50500000.0 50500000.0 50500000.0 50500000.0 50500000.0	6094100.0 609410.0 609410.0 6000.0
2 : METHANE 3 : ETHANE 4 : PROPA WE 5 : 1SOBUTANE 6 : W-BUTANE 7 : 1SOPENTANE 7 : 1SOPENTANE 7 : S.A-DIMETHYLPROP 52 : 2,A-DIMETHYLBUTA 52 : 2,A-DIMETHYLBUTA 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 53 : 3-METHYLPENTANE 54 : S.A-DIMETHYLPENTANE 55 : 3-METHYLPENTANE 56 : 3-METHYLPENTANE 57 : 3-METHYLPENTANE 57 : 3-METHYLPENTANE 58 : 3-METHYLPENTANE 59 : 3-METHYLPENTANE 59 : 3-METHYLPENTANE 50 : 3-METHYLPE	\$2800.0 \$2800.0 \$11210.0 \$2800.0 \$86510.0 \$80610.0 \$0 \$115810.0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	0 0 0 0 0 0 0 0 0 0	F18000.0 F18000.0 G28600.0 60510.0 G386710.0 G386710.0 G15810.0 G1000.0 0.00004287 0.00003887 0.000001513 0.000001043 0.000001043 0.000001043 0.000001043 0.000001043 0.000001043 0.000001043 0.0000043 0.0000043 0.000044 0.000044 0.000044 0.000044 0.000044 0.00004 0.00	809410.0 808416.0 90.0 0.0 0.0 0.0 0.0 0.0 0.0	
46: NITROGEN 2: METHANE 3: ETHANE 47: PROPANE 6: ISOBUTANE 6: ISOBUTANE 6: N-BUTANE 7: ISOPENTANE 7: ISOPENTANE 8: N-PENTANE 8: N-PENTANE 8: N-PENTANE 10: N-HEXANE 71: NO-PENTANE 72: 2,2-DIMETHYLBUTA 73: 3-METHYLBUTA 74: S-METHYLBUTA 75: 2,3-DIMETHYLBUTA 76: N-PENTANE 77: NO-PENTANE 78: 3-METHYLBUTA 79: N-PENTANE 70: N-PENTANE 70: N-PENTANE 70: N-PENTANE 70: N-PENTANE	201000.0 \$21800000.0 \$201000.0 \$201000.0 \$201000.0 \$2000.0 \$11510.0 \$80510.0 \$80510.0 \$80510.0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	14/£# 203700000.0 203700000.0 30830000.0 118000.0 963600.0 80510.0 9636200.0 80510.0 0 153810.0 0 0 0 0 207360.0 0 370500.0	0.00000058F-07 0.00000058B-07 0.000001613 0.000001613 0.000001613 0.000001613 0.000001613 0.000001613 0.000001613 0.00000000000000000000000000000000000	\$ omulov \$ omul
49 : CARBON DIOXIDE 3 : METHANE 4 : PROPANE 6 : ISOBUTANE 6 : N-BUTANE 9 : 22-DIMETHYLPROP 7 : ISOPENTANE 8 : N-PENTANE 56 : 2,3-DIMETHYLBUTA 56 : 2,3-DIMETHYLBUTA 57 : 2,3-DIMETHYLBUTA 70 : N-PENTANE 58 : A-PENTANE 59 : A-PENTANE 10 : N-HEXANE 10 : N-HEXANE 10 : N-HEXANE 11 : NENTAYLONIANE 12 : N-BUTANE 13 : N-BUTANE 14 : N-BUTANE 16 : N-BUTANE 17 : N-BUTANE 18 : N-BUTANE 19 : N-BUTANE 10 : N-BUTA	\$21800000.0 \$201000.0 \$28000.0 \$28000.0 \$21510.0 \$2500.0 \$2500.0 \$2500.0 \$2500.0 \$2500.0 \$2500.0 \$2500.0 \$2500.0 \$2500.0	0 0 0 0 0 0 0 0 0 0 0 0 0	203700000.0 308800000.0 118000.0 80510.0 80510.0 625200.0 15810.0 15810.0 0 0 0 0 0 0 0 207360.0 0 370500.0	0.000000000 1500000000000000000000000000	6000.0 60410.0 60410.0 6051

Flowrates

Properties

Temperature	F	70		
Pressure	psia	14.7		
Enthalpy	Btu/hr	-350462.6		
Entropy	Btu/hr/R	-559.2596		
Vapor Fraction		0		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18.7819	0.177442	18.6044
Flowrate	lb/hr	355.7557	20.582	335.1737
Mole Fraction		1	0.009448	0.990552
Mass Fraction		1	0.057854	0.942146
Molecular Weight	es. #	18.9414	115.993	18.0158
Enthalpy	Btu/Ibmol	-18659.6272	-16137.915	-18683.6783
Enthalpy	Btu/lb	-985.1216	-139.1284	-1037.0714
Entropy	Btu/lbmol/R	-29.7766	-17.9358	-29.8895
Entropy	Btu/lb/R	-1.572	-0.154628	-1.6591
Ср	Btu/lbmol/R		57.5519	17.9991
Ср	Btu/lb/R		0.4962	0.9991
Cv	Btu/lbmol/R		50.6338	17.8638
Cv	Btu/lb/R		0.4365	0.9916
Cp/Cv Densitv	(F.1610		1.1366	1.0076
Z-Factor	lb/ft3		44.2825	62.3039
	and then the		0.006775	0.0007479
Flowrate (T-P)	gal/min		0.057951	0.670754
Flowrate (STP) Specific Gravity	gal/min GPA STP		0.057565	0.670023
Viscosity	GPA 31P		0.714752 0.555862	1
Thermal Conductivity	Btu/hr/ft/R		0.065905	0.975963
Surface Tension	dyne/cm		21.2845	0.346918
Reid Vapor Pressure (ASTM-A)		unconversed	21.2043	72.5713
True Vapor Pressure at 100 F	psia	unconverged	20.13	
Critical Temperature (Cubic E	F	695.4634	20.13	
Critical Pressure (Cubic EOS	psia	3249.6418		
Dew Point Temperature	F	211.5533		
Bubble Point Temperature	F	-120.2425		
Water Dew Point Temperature of				
Liquid 2 Freezing Point	F	31.986		
Stream Vapor Pressure	psia	14.7		
Latent Heat of Vaporization (I	Btu/lb	925.8829		
Latent Heat of Vaporization (I	Btu/lb	1063.375		
CO2 Freeze Up	Danb	No		
Heating Value (gross)	Btu/SCF	59.62		
Heating Value (gross)	Btu/SCF	55.37		
Wobbe Number	Btu/SCF	73.12		
Average Hydrogen Atoms	3.000	2.1498		
Average Carbon Atoms		0.0771		
Hydrogen to Carbon Ratio		27.8701		
,		27.0701		

RE: TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil & Gas Company LP sites

Woodall, James [James.Woodall@conocophillips.com]

Sent: Wednesday, July 11, 2012 1:12 PM

To: airog

Cc: Black, Randy C [Randy.C.Black@conocophillips.com]

TCEQ Oil & Gas Staff,

Yes, please apply these answers across the board for Burlington Resources Oil & Gas Company LP in the following counties: Live Oak, Karnes, DeWitt. I am not charged with work in the Barnett or further South in Texas near Laredo, which may have permits under Burlington. You will have to contact the appropriate technical contact for their answers.

Responses:

- 1. An electronic authorization letter is acceptable.
- 2. Burlington implements projects as equipment becomes available after making sure compliance obligations are met. Some, but not all of these have been fully implemented.
- 3.Burlington does not wait on TCEQ authorization to construct these facilities because that is not required under TAC 106.512 or by submitting a permit package voluntarily under the new "Barnett" standard permit. Burlington uses these two permitting devices to allow flexibility on construction timing and operational requirements.
- 4. There are no updates to these authorization requests at this time. If something comes up during further review, it will be addressed it in a timely manner.

As always, please do not hesitate to contact me by e-mail or phone 832.486.6508 if you require further assistance.

Regards,

James Woodall Senior Environmental Specialist ConocoPhillips Company

From: airog [mailto:airog@tceq.texas.gov] Sent: Wednesday, July 11, 2012 12:47 PM

To: Woodall, James Cc: Black, Randy C

Subject: [EXTERNAL]TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil & Gas

Company LP sites

Site Name - Permit

	1893 Oil & Gas Ltd Unit A1	104138	12. Karnes Central Facility 4	104196
2.	Joe Mahan Unit B1	104151 🗸	13. Seidel Unit C1	104100 /
3.	1893 Oil & Gas Ltd Unit E1	104158/	14. Bensmiller Unit 1a	104106 🖊
4.	Rafter Two Unit C1	104148~	15. D Baker Unit A2	104110
5.	Stolte Unit A1	104149 /	16. A Vaughn Unit A1	104101
6.	Dewitt Central Facility 8	104145	17. J Rossett Unit A1	104105
7.	Sugarloaf Central Facility 11	104157	18. Brown Jenkins Unit A1	104077
8.	Dewitt Central Facility #10	104155	19. D Baker Unit B1	104082 🖊
9.	D Baker Unit A1	98501 🗸	20. Allen Unit A1	100363 ~

RE: TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil ... Page 2 of 2

10. Karnes Central Facility 13
11. Karnes Central Facility 8
104139
21. Gwosdz Unit A1
104114
22. Jo Ann Esse Unit F1
104140
23. Karnes Central Facility 11
104085

The TCEQ Air Permits Division Rule Registrations Section has received a registration for your sites.

In an effort to process your registration request more efficiently, please respond to the following:

In the case of Burlington Resources Oil & Gas Company LP, is it possible that the following 4 questions can be applied to **all pending** projects, as well as **any** future projects? If so, this email will no longer be neccessary. Please indicate in your response whether or not this is possible.

- 1. To confirm if the company agrees to receive the response letter electronically and that no hard copy will need to be sent. All completed projects can be viewed at: https://webmail.tceq.state.tx.us/gw/webpub.
- 2. If the company has implemented the project.
- **3.** If the company is waiting on a response from the TCEQ before starting construction.
- 4. If you have any updates to the project listed above, please send them in now.

Please note that these items constitute an initial review only. A full technical review may be completed at a later date and additional questions may be added. **We would appreciate a complete response within five business days of the date of this e-mail.** Please only respond once you have fully addressed each of the requested items. If a complete response is not received, a deficiency letter may be issued allowing the company up to six months in which to respond without an additional registration fee. Further information about this voidance process may be found at: http://www.tceg.texas.gov/assets/public/permitting/air/memos/voidguide06.pdf.

For tools to complete a registration and detailed information on the PBR for Oil and Gas Handling and Production Facilities go to:

http://www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil_and_gas.html.

For tools to complete a registration and detailed information on the Standard Permit for Oil and Gas Handling and Production Facilities go to:

http://www.tceq.texas.gov/permitting/air/newsourcereview/chemical/oil_and_gas_sp.html.

Other helpful information for oil and gas sites can be found at: www.texasoilandgashelp.org.

If you need clarification regarding the questions above, please call 512-239-1250 and request to speak to a reviewer in Rule Registration about this project.

The TCEQ continually strives to provide quality customer service and we value your opinion. We encourage you to tell us about your experience and how you believe we can improve. We ask that you take a moment to complete our <u>customer survey</u> to assist us in serving you better in the future.

Thank you for helping to protect the environment in Texas,

The Rule Registrations Section

TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil & Gas Company LP sites

airog

Sent: Wednesday, July 11, 2012 12:46 PM **To:** james.woodall@conocophillips.com **Cc:** randy.c.black@conocophillips.com

Site Name - Permit

1.	1893 Oil & Gas Ltd Unit A1	104138	12. Karnes Central Facility 4	104196
2.	Joe Mahan Unit B1	104151	13. Seidel Unit C1	104100
3.	1893 Oil & Gas Ltd Unit E1	104158	14. Bensmiller Unit 1a	104106
4.	Rafter Two Unit C1	104148	15. D Baker Unit A2	104110
5.	Stolte Unit A1	104149	16. A Vaughn Unit A1	104101
6.	Dewitt Central Facility 8	104145	17. J Rossett Unit A1	104105
7.	Sugarloaf Central Facility 11	104157	18. Brown Jenkins Unit A1	104077
8.	Dewitt Central Facility #10	104155	19. D Baker Unit B1	104082
9.	D Baker Unit A1	98501	20. Allen Unit A1	100363
10.	Karnes Central Facility 13	104160	21. Gwosdz Unit A1	104114
11.	Karnes Central Facility 8	104139	22. Jo Ann Esse Unit F1	104140
	·		23. Karnes Central Facility 11	104085

The TCEQ Air Permits Division Rule Registrations Section has received a registration for your sites.

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- **1.** To confirm if the company agrees to receive the response letter electronically and that no hard copy will need to be sent. All completed projects can be viewed at: https://webmail.tceq.state.tx.us/gw/webpub.
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- 3. If the company is waiting on a response from the TCEQ before starting construction.
- 4. If you have any updates to the project listed above, please send them in now.

Please note that these items constitute an initial review only. A full technical review may be completed at a later date and additional questions may be added. **We would appreciate a complete response within five business days of the date of this e-mail.** Please only respond once you have fully addressed each of the requested items. If a complete response is not received, a deficiency letter may be issued allowing the company up to six months in which to respond without an additional registration fee. Further information about this voidance process may be found at: http://www.tceq.texas.gov/assets/public/permitting/air/memos/voidquide06.pdf.

For tools to complete a registration and detailed information on the PBR for Oil and Gas Handling and Production Facilities go to:

http://www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil and gas.html.

For tools to complete a registration and detailed information on the Standard Permit for Oil and Gas Handling and Production Facilities go to:

http://www.tceq.texas.gov/permitting/air/newsourcereview/chemical/oil_and_gas_sp.html.

Other helpful information for oil and gas sites can be found at: www.texasoilandgashelp.org.

If you need clarification regarding the questions above, please call 512-239-1250 and request to speak to a reviewer in Rule Registration about this project.

The TCEQ continually strives to provide quality customer service and we value your opinion. We encourage you to tell us

https://bl2prd0510.outlook.com/owa/?ae=Item&t=IPM.Note&id=RgAAAADUsODBc1S7... 7/11/2012

TCEQ APD Info. Request for 23 Pending & ANY Future Burlington Resources Oil & Ga Page 2 of 2
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about your experience and how you believe we can improve. We ask that you take a moment to complete our <u>customer survey</u> to assist us in serving you better in the future.

Thank you for helping to protect the environment in Texas,

The Rule Registrations Section

Marcus McDermott

From:

Woodall, James [James.Woodall@conocophillips.com]

Sent:

Tuesday, July 10, 2012 4:14 PM

To:

Marcus McDermott

Subject:

Burlington Resources Oil & Gas Company Project Response - Representative Analyses

Mr. McDermott.

As we discussed on the phone today, ConocoPhillips has determined an approach to your representative analysis request that we think is appropriate for as accurate as possible in a cost effective manner. Since most of our wells are drilled in groups by area we have taken six sample sets from producing wells, each set including the composition and characteristics of low pressure gas, low pressure condensate upstream of tank, and stock tank liquids. For each area we're drilling in we have some sort of cut ratio we expect out of a well which we use to select from one of three of the sample sets (gas well, oil well, transitional well) depending on how much gas/bbl we expect to be produced. There are two main areas of drilling, three sets per area, giving the six production sets. We have also taken an inlet composition at our central facilities (one for each area) in a similar manner. Since these share pipeline at some point in the area, we think this is appropriate to use for permitting calculations. Many of these wells are not yet drilled and so we can not determine a composition to specifically match what you are requesting with the speciation you require for permitting. Since we do experience sour gas at some of our wells, we need to permit before operation and have thus been using the method descried above. As for H2S content, we do take many samples in the field and we try and pull the closest sample that has been taken to the well about to be drilled so we can apply that concentration (usually bumped up a bit) to our permit application. We've also discussed this approach with Marc Olivier, Margaret Schell, Sandhya Bhaskara, and Isaac Vela.

Please let me know if you need anything else and I'll be happy to oblige.

Regards,

James Woodall

Oil and Gas Initial Screening Sheet

Company: Burlington Resources Permit No.: NA	410	Project No.: 1797	158
Company: Surlington Resources Permit No.: 14 Initial Revision Renewal Response to Deficiency Previous reviewer:	<i>y</i>	Date Screened:	1/9/12
Certified? Yes No Process/Project Description Signature matches RO or TC/DAR Emission Summary (Table 1a) VOC tpy: 12.81 NOx tpy: 5.08 CO tpy: 16.17 SO ₂ tpy: For non-Barnett Shale SP: 106.261/106.262 speciation of all project emissions (excluding eng Comments:	1.15	ription (checklists or eq H ₂ S tpy:	
Lab Analysis ☐ Actual site Representative ☐ Included justification for representative analysis ☐ Sweet ☐ Sour ☐ Analysis tested for H₂S ☐ >1/4 mile to receptor (non-BSh PF☐ Gas ☐ Liquids ☐ Flash Gas Notes: Comments: Applicant informed furtification needed			
Tank Emissions Condensate Crude oil Produced water Other liquids: TANKS 4.0 E&P Tanks Other method: Flash: Winsim Emissions are controlled by: Flave Comments: VIS calculated using AP 4.2 up 7 Truck Loading Condensate Crude oil Produced water 12.46 x SPM/T Other method:	+ Wir	, Sim	_
☐ Emissions controlled by: ☐ Collection efficiency: ☐ % ☐ Con Comments: ☐ Compressor Engines/Turbines ☐ Manufacturer spec. sheets or equivalent ☐ If controlled, control spec. sheets or equiv. Meet NSPS JJJJ ☐ Yes ☐ No ☐ NA ☐ MACT ZZZZ Comments: ☐	modeling t		ght method
Fugitives Gas Liquids used TCEQ emission factors Comments:			_
Glycol Units GRI-GLYCalc			_
Control Devices Flare □ Combustor □ Thermal Oxidizer □ VRU □ NSPS 60.18 Alternate operating Control efficiency 93 % If over baseline efficiency, description/justification provided? [Comments: □		led? 🗌 Yes 🗌 No	
MSS (optional until January 5, 2014) Description of activity, duration, and frequency Comments:			_
Project recommended to be transferred to technical reviewer? Recommended reviewer:			ate 3/30/2012

DEPOSIT INFORMATION FORM

DATE: 07/09/2012

REGISTRATION/PERMIT NUMBER:

ACCOUNT NUMBER - n/a

*If the customer has no account number, please indicate "no account number".

CHECK NUMBER:

24853

CHECK AMOUNT: \$450.00

CHECK DATE: 06/26/2012

CHECK MAKER: Titan Engineering Inc.

PAID FOR: Burlington Resources Oil & Gas Company LP

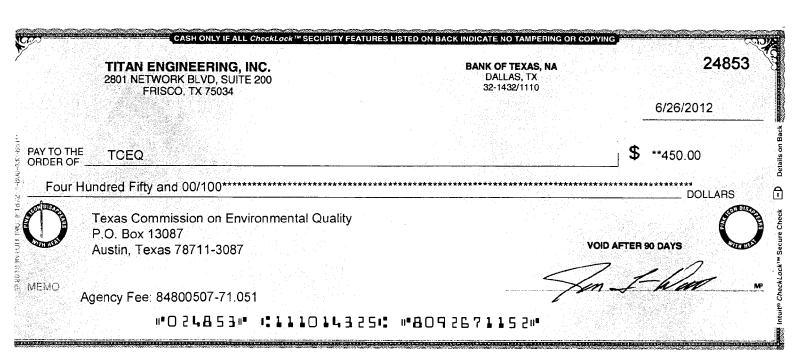
(If different from check maker)

PERSON TAKING BACKUP: Sandra Young PROGRAM/DIVISION: OA/APD/APIRT

TELEPHONE NUMBER: 239-1326

Purpose of Check: pbr

Check attached below:





I. REGISTRANT INFORM	ATION		· · · · · · · · · · · · · · · · · · ·		
A. Company or Other Legal Cus	stomer Name: Burlington	Resources Oil &	Gas Company LP		
Company Official Contact N					
Title: Manager of Production C	perations- GCBU				
Mailing Address: 600 N Dain	/ Ashford, Westlake 3, #15	5012			
City: Houston	State: TX		ZIP Co	de: 77079	
Phone: (832) 486-6508	Fax: 832-486-64	J31	E-mail:	randy.c.blac	k@conocophillips.com
B. Technical Contact Name: Ja	mes Woodall		<u>-</u>		
Title: Sr. Environmental Speci	alist				
Company: Burlington Resource	ces Oil & Gas Company LF	·			
Mailing Address: 600 N Dair	/ Ashford, Westlake 3, #15	5012			
City: Houston	State: TX	\$40m)	ZIP Co	de: 77079	
Phone: (832) 486-6508	Fax: 832-486-64		E-mail:	james.wood	all@conocophillips.com
C. Facility Location Information	- Street Address:		· •		
If "NO," street address, provide	written driving direction	ns to the site: (a	uttach description	if additiona	l space is needed)
From the intersection of US-281 and FM 99 in Whitse miles and enter lease road on right and turn left, cont					
City: Whitsett	County: Live (Dak	ZIP Co	de: 78008	
D. Is the Core Data Form (TCE)	Q Form 10400) attached	1?	· · · · · · · · · · · · · · · · · · ·		¥ YES □ NO
If "No," provide customer referen	nce number and regulate	d entity number	r below:		
Customer Reference Number (Cl	N): 602989436				
Regulated Entity Number (RN):	TBD /06450	6817			
II. FACILITY AND SITE IN					
A. Name and Type of Facility: J	o Ann Esse Unit F	1		⋉ Pern	nanent Portable
B. PBR claimed under 30 TAC	106 (List all):				
106. 352 Oil and Gas Production Fa	acilities	106.			
106. 492 Flares		106.	106.		
106.		106.			100
Are you claiming a historical sta	ndard exemption or P	BR?			☐ YES 🗷 NO
If "YES," enter effective date(s)	and rule number(s) in th	e spaces provia	led below.		
				7	
TCEQ 20182 (Revised 02/12) Form PI-7 CF			JUL 0 6 20	112	·
This form for use by facilities subject to air may be revised periodically. (APDG 5379v		ina	1 302 00 20		Page of

2-3



II.	FACILITY	AND SITE	INFOR	MATION	(continued)			11.00		
C.	Is there a prev	ious Standa	rd Exem	ption or PE	BR for the fa	cility i	n this registrati	on?		☐ YES 🗷 NO
	If "YES," ente	er registratio	on numb	er(s), rule	number(s) a	nd effe	ective dates in t	he spaces	provided	below.
D.	Are there any PBR?	other facilit	ies at thi	is site which	n are authori	zed by	an Air Standa	rd Exemp	tion or	YES X NO
	If "YES," ente	er registratio	on numb	er(s), rule	number(s) a	nd effe	ective dates in t	he spaces	provided	below.
		·								
E.	Are there any	other air pre	econstru	ction permi	ts at this site	?				☐ YES 🗷 NO
	If "YES," ente	er permit nu	mber(s)	in the spac	es provided	below				
	Are there any this project?	other air pre	constru	ction permi	ts at this site	that v	vould be direct	ly associat	ed with	☐ YES 🗷 NO
	If "YES," ent	er permit nu	mber(s)	in the spac	es provided	below				
F.	Is this facility Operating Per			_			eral	YES	× NO [To be determined
	If the site curr	ently has an	existing	g federal op	erating pern	nit, ent	er the permit n	umber.		
	Check the req	uirements o	f 30 TA	C Chapter 1	122 that will	be tri	ggered if this co	ertification	is accept	ted.
	Initial Applica	tion for an F	FOP	☐ Signi	ficant Revis	ion for	an SOP	Mino	r Revision	n for an SOP
	Operational Fl	lexibility/off	Permit	Notification	n for an SOF)		Revis	sion for G	OP
	To be Determi	ined		▼ None	:					
	Identify the ty	pe(s) issued	and/or	FOP applic	ation(s) sub	mitted	pending for the	e site. <i>(Cl</i>	eck all th	at apply)
	SOP	GOP		GOP ap	oplication/re	vision	application: S	ubmitted o	or under A	APD review.
×	N/A	SOP ap	plication	v/revision a	pplication:	submit	ted or under A	PD review	/ .	
G.	TCEQ Accou	nt Identifica	tion Nu	mber (<i>if kno</i>	own):		TBD			

TCEQ 20182 (Revised 02/12) Form PI-7 CERT
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III.	FEE INFORMATION			
	See Section VI. for address to send fee or go to www6.tce	q.tex	as.gov/epayto pay online.	
A.	Is this certification to solely establish a federally enforceal new facilities?	ble e	mission limit and not authorize any	☐ YES 🗷 NO
	If "YES," than no fee is required.			
	If "NO," then go to Section III.B.			
В.	If "YES," to any of the following three questions, a $\$100$	fee is	s required. Otherwise, a \$450 fee is r	equired.
	Does this business have less than 100 employees?			☐ YES 🗷 NO
	Does this business have less than 6 million dollars in annu	ıal gı	coss receipts?	YES 🗷 NO
	Is this registration submitted by a governmental entity with	h a p	opulation of less than 10,000?	YES 🗷 NO
C.	Enter the check, money order, or transaction number.		24853	
	Enter the individual or company name printed on the chec	k.	TITAN Engineering, Inc.	
	Fee amount (spell out): Four Hundred and Fifty Dollars and N	No Ce	ents	\$ 450.00
	Was fee Paid online?			YES NO
IV.	SELECTED FACILITY REVIEWS ONLY—TECHN	NICA	AL INFORMATION	
	e: If claiming one of the following PBRs, complete this se istration" below:	ection	, then skip to Section VI., "Submitting	g your
Gra	mal Feeding Operations 30 TAC 106.161, Livestock Aucti in Handling, Storage and Drying 30 TAC 106.283, Auto I tain Incinerator 30 TAC 106.496			
Α.	Is the applicable PBR checklist attached which shows the requirements of the PBR(s) being claimed?	facil	ity meets all general and specific	☐ YES ☐ NO
В.	Distance from this facility's emission release point to the	neare	est property line:	feet
	Distance from this facility's emission release point to the	neare	est off-property structure:	feet
V.	TECHNICAL INFORMATION - The following infor Place a check next to the appropriate box to verify yo			rm PI-7CERT.
×	Process Flow Diagram	× S	ite Process and Project description	
x	Emissions data and calculations	× T	Table 1(a) (Form 10153) Emission Po	int Summary

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V. TECHNICAL INFORMATION - The following inf Place a check next to the appropriate box to verify		
Information on meeting the specific PBR requirements (PBR checklists maybe used and are optional.)	Information on meeting the general PB 30 TAC 106.4. (PBR checklists maybe are optional.)	
Note: Please be reminded that if the facilities listed in this program under 30 TAC Chapter 101, Subchapter H, Divis allowances equivalent to the actual NO_x , emissions from the	ion 3, the owner/operator of these facilities	•
Distance from this facility's emission release point to the ne	arest property line:	>50 feet
Distance from this facility's emission release point to the ne	arest off-property structure:	>4700 feet
Note: In limited cases, a map or drawing of the site and su review or at the request of the TCEQ Regional Office or loc		
VI. SIGNATURE FOR CERTIFICATION AND RE	GISTRATION	
The signature below indicates that the Responsible Official are true, accurate, and complete to the best of my knowledg listed on this certification reflect the maximum anticipated erepresentations in this certification of emissions are condition understood that it is unlawful to vary from these representate certifies that to the best of the Responsible Official's knowle limitations of the indicated exemption or permit by rule and the Texas Commission on Environmental Quality and with governing air pollution. The signature below certifies that, inquiry, the statements and information above and contained If you questions on how to fill out this form or about air are entitled to request and review their personal information any errors in their information corrected. To review such in	e and belief. By this signature, the maximum emissions due to the operation of this facility ons upon which the facilities and sources will ions unless the certification is first revised. The facility will operated in compliance with facility will operated in compliance with Federal U.S. Environmental Protection Ager based on information and belief formed after a in the attached document(s) are true, accurate quality permits. Please call (512) 239-12 in that the agency gathers on its forms. They	m emission rates y and all ll operate. It is The signature onditions and h all regulations of ncy regulations r reasonable ate, and complete. 150. Individuals
SIGNATURE:	PROJUNED)	6/22/12
(ORIGINAL SIGNATURE	KEQUIKED)	DATE

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TCEQ-10400 (09/07)

TCEQ Use Only

TCEQ Core Data Form

1. Reason for Submission (if other is checked please describe in space provided)	OF COLOR		ailed instructions regarding comple	etion of	this forn	n, please read	the Core	Data Form Instruct	tions or o	call 512-23	9-5175.	
New Permit, Registration or Authorization (Core Data Form should be submitted with the program application) Cher												
Renewal (Coro Data Form should be submitted with the renewal form)	11		·				•					
2. Attachments Describe Any Attachments: (ex. Title V Application, Waste Transporter Application, etc.) [Yes	h	<u>~</u>					nitted wit	h the program ap	oplicatio	on)		
Section No Permit by Rule Registration Section Follow this link to search for CN of RN numbers in Central Registry' RN TBD												
3. Customer Reference Number (if issued) CN 602989436 SECTION II: Customer Information 5. Effective Date for Customer Information Updates (mmlddlyyyy) 6. Customer Role (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check only one of the following: Owner Operator Owner Operator Owner & Owner & Operator Owner & Owner		nts			Title V A	pplication, Wa	ste Trans	porter Application,	etc.)		,	
CN 602989436 Central Registry** RN TBD												
SECTION II: Customer Information 5. Effective Date for Customer Information Updates (mm/dd/yyyy) 6. Customer Role (Proposed or Actual) – as it relates to the Resultate Intity Insted on this form. Please check only one of the following: Owner			e Number (if issued)						Refere	nce Numl	oer (if issued)	
S. Effective Date for Customer Information Updates (mm/dd/yyyy)	CN 6029	89436					RI	1 TBD				
Customer Role (Proposed or Actual) — as it relates to the Regulated Entity listed on this form. Please check only one of the following:	SECTION	VII: C	ustomer Information	<u>n</u>								
Owner	5. Effective I	Date for C	ustomer Information Update	s (mm	/dd/yyy	/y)						
Occupational Licensee	6. Customer	Role (Pro	posed or Actual) - as it relates to	the <u>Re</u> g	ulated E	ntity listed on	this form.	Please check only	one of	the followin	g:	
New Customer Update to Customer Information Change in Regulated Entity Ownership No Change in Legal Name (Verifiable with the Texas Secretary of State) No Change**	Owner		☐ Operator		V 0	wner & Ope	rator					
New Customer	Occupation	nal Licens	ee Responsible Party		□ ∨	oluntary Clea	anup App	licant 🔲 🗆	Other:			_
Change in Legal Name (Verifiable with the Texas Secretary of State) 7 No Change** **If "No Change" and Section I is complete, skip to Section III - Regulated Entity Information. Sole Proprietorship- D.B. A	7. General C	ustomer	nformation						·			
Change in Legal Name (Verifiable with the Texas Secretary of State) No Change** **If "No Change" and Section I is complete, skip to Section III - Regulated Entity Information. Sole Proprietorship- D.B.A City Government	☐ New Cus	tomer		Update	e to Cu	stomer Inform	nation	☐ Cha	ange in	Regulated	d Entity Ownership)
8. Type of Customer: Corporation Individual Sole Proprietorship- D.B.A City Government County Government Federal Government State Government Other Government General Partnership Limited Partnership Other: 9. Customer Legal Name (If an individual, print last name first: ex: Doe, John) If new Customer, enter previous Customer End Date: 10. Mailing Address: City State ZIP ZIP ZIP+4 11. Country Mailing Information (if outside USA) 12. E-Mail Address (if applicable) 13. Telephone Number 14. Extension or Code 15. Fax Number (if applicable) 16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number (if applicable) 19. TX SOS Filing Number (if applicable) 20. Number of Employees 21. Independently Owned and Operated? 0-20 21-100 101-250 251-500 501 and higher Yes No	☐Change in	n Legal Na							_	-		
City Government County Government Federal Government State Government	**If "No Cha	nge" and	Section I is complete, skip to	Secti	on III –	Regulated	Entity Int	formation.				
Other Government General Partnership Limited Partnership Other: 9. Customer Legal Name (If an individual, print last name first: ex: Doe, John) If new Customer, enter previous Customer below 10. Mailing Address: City State ZIP ZIP 4 11. Country Mailing Information (If outside USA) 12. E-Mail Address (If applicable) 13. Telephone Number 14. Extension or Code 15. Fax Number (If applicable) 16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number (If applicable) 19. TX SOS Filing Number (If applicable) 20. Number of Employees 21. Independently Owned and Operated? 0-20 21-100 101-250 251-500 501 and higher 79 Yes No	8. Type of C	ustomer:	Corporation			ndividual		☐ Sole Prop	rietorsh	ip- D.B.A		
9. Customer Legal Name (If an individual, print last name first: ex: Doe, John) In the customer, enter previous Customer below End Date:	City Gove	ernment	☐ County Government		□F	ederal Gove	rnment	☐ State Gov	ernmer	nt		
10. Mailing Address: City State ZIP ZIP ZIP + 4 11. Country Mailing Information (if outside USA) 12. E-Mail Address (if applicable) 13. Telephone Number 14. Extension or Code 15. Fax Number (if applicable) 16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number (if applicable) 20. Number of Employees 21. Independently Owned and Operated? 0-20 21-100 101-250 251-500 501 and higher Yes No						imited Partn	ership	Other:				
10. Mailing Address: City State ZIP ZIP + 4 11. Country Mailing Information (if outside USA) 12. E-Mail Address (if applicable) 13. Telephone Number 14. Extension or Code 15. Fax Number (if applicable) 16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number (if applicable) 19. TX SOS Filing Number (if applicable) 20. Number of Employees 21. Independently Owned and Operated? 0-20 21-100 101-250 251-500 501 and higher Yes No	9 Customer	Legal Na	me /If an individual print last par	ne first:	ex: Doe			stomer, enter prev	rious Cu	ıstomer	End Date:	
Address: City State ZIP ZIP + 4 11. Country Mailing Information (if outside USA) 12. E-Mail Address (if applicable) 13. Telephone Number 14. Extension or Code 15. Fax Number (if applicable) 16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number(if applicable) 20. Number of Employees 21. Independently Owned and Operated? O-20												
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City State ZIP ZIP ZIP + 4 11. Country Mailing Information (if outside USA) 12. E-Mail Address (if applicable) 13. Telephone Number												
11. Country Mailing Information (if outside USA) 12. E-Mail Address (if applicable) 13. Telephone Number 14. Extension or Code 15. Fax Number (if applicable) 16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number(if applicable) 19. TX SOS Filing Number (if applicable) 20. Number of Employees 21. Independently Owned and Operated? 0-20	Additos.	City		5	State		ZIP			ZIP + 4		
13. Telephone Number 14. Extension or Code 15. Fax Number (if applicable) 16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number(if applicable) 19. TX SOS Filing Number (if applicable) 20. Number of Employees 21. Independently Owned and Operated? O-20	11 Country		formation (if outside USA)			12	E-Mail Ac	Idroce (it analisah)	la)		<u> </u>	
16. Federal Tax ID (9 digits) 17. TX State Franchise Tax ID (11 digits) 18. DUNS Number(if applicable) 19. TX SOS Filing Number (if applicable) 20. Number of Employees 21. Independently Owned and Operated? 30-20 21-100 101-250 251-500 501 and higher Yes No	11. Country	mailing in	TOTTIALION (II OUISIDE USA)			12.	C-IMAII AL	iuress (ii applicabl	ie)			
20. Number of Employees 21. Independently Owned and Operated? □ 0-20 □ 21-100 □ 101-250 □ 251-500 □ 501 and higher □ Yes □ No	13. Telephor	ne Numbe	r	14. E	xtensi	on or Code		15. Fax I	Numbe	r (if applic	able)	
20. Number of Employees 21. Independently Owned and Operated? □ 0-20 □ 21-100 □ 101-250 □ 251-500 □ 501 and higher □ Yes □ No												
□ 0-20 □ 21-100 □ 101-250 □ 251-500 □ 501 and higher □ Yes □ No	16. Federal 1	Tax ID (9 di	gits) 17. TX State Franchise	Tax IC) (11 digi	its) 18. D	UNS Nur	nber(if applicable)	19. TX	SOS Fili	ng Number (if applic	able)
□ 0-20 □ 21-100 □ 101-250 □ 251-500 □ 501 and higher □ Yes □ No												
	l			_				21. I n o	•	•		1?
	[21-100) [501 aı	nd higher			Y	'es	∐ No	
SECTION III: Regulated Entity Information												
22. General Regulated Entity Information (If 'New Regulated Entity" is selected below this form should be accompanied by a permit application)	l <u>—</u>			-		·						
✓ New Regulated Entity Update to Regulated Entity Name Update to Regulated Entity Information No Change** (See below)	New Reg	ulated Ent	<u> </u>			•					No Change** (See t	oelow)
**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.	20 D	4 F44 . N						tion IV, Preparer In	formatio	Π.		
				regulat	ed actio	n is taking pla	ce)					
23. Regulated Entity Name (name of the site where the regulated action is taking place)	Jo Ann E	sse Ur	III F I					- 		2040		
				, ogulat	ou dollo	ir is taking pla	· <i>i</i>					
	LOCA MILL	,550 01.	HV I I					1111	00'	2012		

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24. Street Address		 -									
of the Regulated							·				
Entity:										· · · · · · · · · · · · · · · · · · ·	
(No P.O. Boxes)	City			State			ZIP			ZIP + 4	
	600	N Dairy Ashford	k								
25. Mailing Address:	Wes	tlake 3, #15012									
Address.	City	Houston		State	ТХ		ZIP	77079		ZIP + 4	
26. E-Mail Address:	' ' '	nes.woodall@c	onoconhi							- 11 · · ·	
27. Telephone Numbe		nes.weedange	<u></u>	B. Extensio		Code	29	Fax Nur	nber (if applicable	1	
(832) 486-6508	<u></u>			LACOHOLO				2-486-6		7 falso	
<u>`</u>	/A -II -IL	24 Secondo	mr SIC Cod	la (4 15-56.)	32	. Primary N				dary NAIC	S Code
30. Primary SIC Code	(4 digits	31. Seconda	ry SIC Cou	le (4 digits)		or 6 digits)		264.	(5 or 6 digits		
1311	D	in an af thin auti					1111	! !			
34. What is the Prima	-	mess of this entil	yr (Pleas	e ao not rep	Jeat ti	he SIC or NA	102 ae	эстриоп.)			
Natural Gas Produc		04				n	• •		41	1 1114	
Q	1	ns 34 – 37 addres the intersection of t									t to stay on EM
35. Description to	and h	ead north 2.8 miles	. Turn right	onto CR 2	71 ar	nd head eas	t 1.66	miles and	l enter lease roa	d on right a	nd turn left.
Physical Location:	contin	ue for 1.20 miles a	nd turn right	t to continue	e follo	owing lease			es. Site is locate		
36. Nearest City				ounty				State			ZIP Code
Vhitsett			Liv	ve Oak	-	1444	1	ГХ	ı	78008	i
37. Latitude (N) In D	ecima	l:			:	38. Longitu	ide (W) In D	ecimal:		
Degrees	Minutes		Seconds		- 1	Degrees		M	inutes	Sec	conds
28		42	12	2.00		9	8		8		40.00
9. TCEQ Programs an odates may not be made. If y	d ID N	umbers Check all Program is not listed, check	ograms and w	rite in the perr	mits/re	egistration num ore Data Form i	bers tha	at will be aff	fected by the update	es submitted o	n this form or the
☐ Dam Safety		Districts	1	Edwards					lazardous Waste	☐ Mun	icipal Solid Wast
				LI Edwards Aquiter							
☑ New Source Review -	- Air	OSSF	[Petroleum Storage Tan			PWS			Slud	ge
					-						
Stormwater		☐ Title V – Air]	Tires				Used Oil		☐ Util	ities
						re			Other:		
☐ Voluntary Cleanup		☐ Waste Water]	☐ Wastewater Agricultu			re Water Rights		hts	Othe	er:
SECTION IV: P	repa	arer Informa	ation								
40. Name: James	Wood	lall				41	Title:	Sr. I	Environment	al Spe c ial	list
12. Telephone Numbe		43. Ext./Code	44 F	ax Numbe	٠			ail Addre			
832) 486-6508	•	N/A	77	ux Humbe					@conocophil	lins com	
			l			, Jul			<u> </u>		
SECTION V: A											
By my signature b nd that I have signature											
pdates to the ID num				on ochan (or till	e charty spe	CCITICO	a 111 30 00	ion ii, ficid 9	and/or as	required for t
See the Core Data Fo				nation on	who	should sig	gn thi	s form.)			
		n Resources Oi				Job Title			of Productio	n Operati	ons-GCBU
	ady B			17	1	JUN HILL	-• '*'			332) 486-	
- h	$\vec{\supset}$								· ·	,	
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OFO 40400 (00 (00)					2-2		_A	PIR	T		_
CEQ-10400 (09/07)					2-2						Page 2

EFSCOP00005514

TITAN ENGINEERING, ING. 2801 NETWORK BLVD, SUITE 200 FRISCO, TX 75034 BANK OF TEX , NA DALLAS, TX 32-1432/1110

CASH ONLY IF ALL CheckLock "SECURITY FEATURES LISTED ON BACK INDICATE NO TAMPERING OR COPYING

24853

6/26/2012

PAY TO THE ORDER OF

TCEQ

**450.00

DOLLARS



Texas Commission on Environmental Quality P.O. Box 13087 Austin, Texas 78711-3087

VOID AFTER 90 DAYS



CheckLock** Secure Check

Agency Fee: 84800507-71.051

#O24853# #111014325# #B092671152#

TITAN ENGINEERING, INC.

24853

TCEQ

Date

6/26/2012

Туре

Bill

Reference

84800507-71.051

Original Amt. 450.00 6/26/2012 Balance Due Discount 450.00

Check Amount

Payment 450.00 450.00

Bank of Texas Operati Agency Fee: 84800507-71.051

450.00

JUL 0 6 2012 APIRT



July 3, 2012

Air Permits Initial Review Team (APIRT), MC 161 Texas Commission on Environmental Quality 12100 Park 35 Circle, Building C, Third Floor Austin, Texas 78753

via FedEx

Subject:

Permit by Rule Registration

Burlington Resources Oil & Gas Company LP

Jo Ann Esse Unit F1 Live Oak County, Texas

CN602989436

Mr. Johnny Bowers:

On behalf of Burlington Resources Oil & Gas Company LP (Burlington Resources), TITAN Engineering, Inc. a Division of Apex Companies, LLC (TITAN), is submitting this Permit by Rule (PBR) registration for operations at the Jo Ann Esse Unit F1 (the Site) located near Whitsett in Live Oak County, Texas. Upon authorization, this PBR will authorize the following Project:

- Three (3) controlled atmospheric condensate storage tanks and associated loading;
- One (1) controlled atmospheric produced water storage tank and associated loading;
- One (1) flare combustion control device; and
- Piping and fugitive components.

TITAN and Burlington Resources believe that the Site and its associated air emissions qualify for PBR under 30 Texas Administrative Code (TAC) §106.352 and §106.492. This letter and the following attachments constitute Burlington Resources' PBR registration submittal to the Texas Commission on Environmental Quality (TCEQ) for the Project:

- Attachment 1 presents a process/project description, area map, and process flow diagram;
- Attachment 2 contains the applicable TCEQ forms and tables;
- Attachment 3 presents emission rate calculations;
- Attachment 4 describes how the Project qualifies for PBR; and
- Attachment 5 includes supporting documentation.

Please note that a copy of this letter, the Form PI-7-CERT, CORE Data Form, and the PBR registration fee of \$450 are being submitted to the TCEQ Revenue Section concurrently with this submittal.

TITAN Engineering, Inc. is a Division of Apex Companies, LLC



2801 Network Boulevard, Suite 200, Frisco, TX 75034 T 469.365.1100 F 469.365.1199 www.titanengineering.com

JUL 0 6 2012

We would like to thank you in advance for your review and concurrence with this PBR registration. If you have any questions regarding the information presented in this letter and attachments, please do not hesitate to contact James Woodall at (832) 486-6508 or via james.woodall@conocophillips.com.

Sincerely,

TITAN Engineering, Inc.

Christina Chermak

Project Manager

Attachments

cc: Ms. Rosario Torres, TCEQ Region 14 – Corpus Christi

Mr. James Woodall, ConocoPhillips Company

TCEQ Revenue Section, MC-214, Bldg. A, Third Floor, Austin, Texas 78753 (Copy of this letter, Form PI-7-CERT, CORE Data Form, and fee only)

JUL 0 6 2012 APIRT

PERMIT BY RULE REGISTRATION

CN602989436

Burlington Resources Oil & Gas Company LP
Jo Ann Esse Unit F1
Live Oak County, Texas

Project No. 84800507-71.051

June 2012





ATTACHMENT 1 PROCESS/PROJECT DESCRIPTION

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 1 PROCESS/PROJECT DESCRIPTION

Jo Ann Esse Unit F1 (Referred to as "the Site") Located in Live Oak County

This Permit by Rule (PBR) registration is being submitted to authorize three (3) condensate storage tanks and associated loading, one (1) produced water storage tank and associated loading, one (1) flare combustion control device, and piping and fugitive components (the Project) at the Site. Figure 1-1 is an area map showing the location of the Site and the surrounding area. Figure 1-2 is a process flow diagram for the Site.

Normal Operations

The Site has a single well which will produce high pressure gas and liquids (condensate and water). The mixture extracted from the well will first pass through a high pressure separator where the high pressure gas will be collected and sent to pipeline. Liquids from the HP separator will then pass to a low pressure separator. Low pressure gas off of the LP separator will go to sales as well, via a low pressure pipeline.

Pressurized liquids from the low pressure separator will be divided into both produced water and condensate streams. Condensate is routed to the condensate storage tanks (FINs [Facility Identification Number] TK-01, TK-02 and TK-03) and water is routed to the produced water tank (FIN TK-04). The emissions associated with the flash from the pressure change as well as the working/breathing emissions from all tanks are routed to a flare (FIN FL-1) and are captured and controlled at a 98% efficiency. As demonstrated in the calculations, assist gas is sent to the flare to ensure that the waste gas stream can sustain combustion.

The condensate and produced water tanks are loaded out periodically (FINs TRUCK1 and TRUCK2), emissions from which are also controlled by the flare (FIN FL-1). The Site will also emit emissions due to equipment component leaks (FIN FUG).

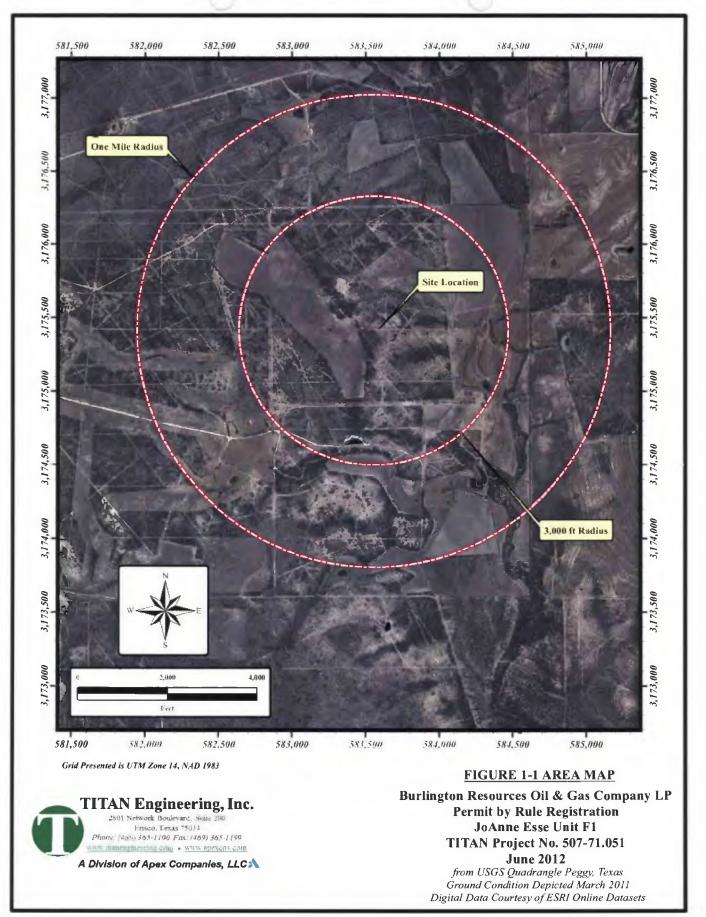
Scheduled Maintenance Startup and Shutdown Events

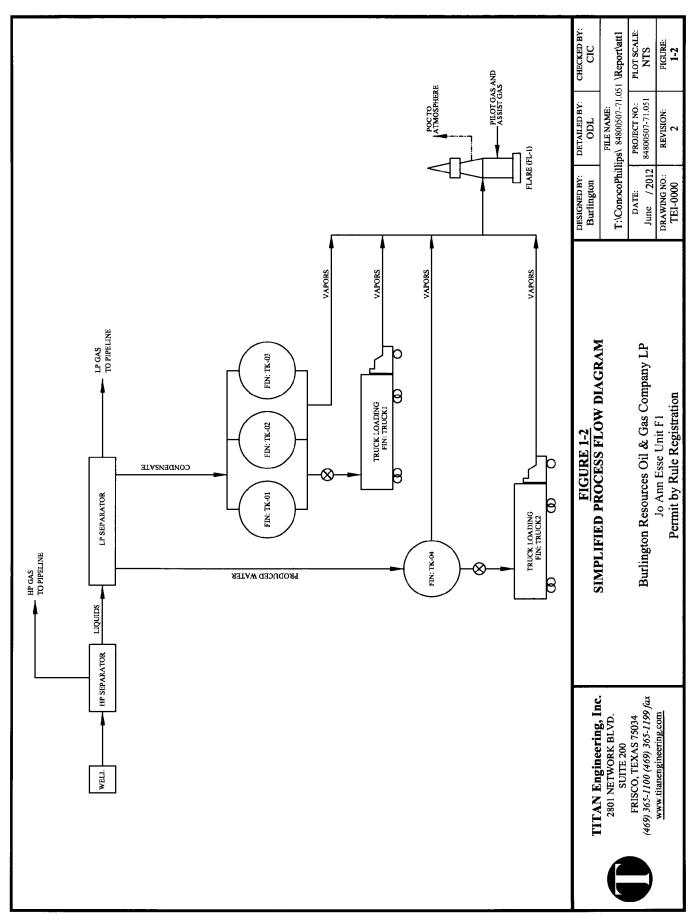
In accordance with TCEQ guidance and 30 Texas Administrative Code (TAC) §106.352, a representation of planned Maintenance, Startup and Shutdown events are included in this PBR registration in addition to the normal operating scenario.

It is conservatively planned that the flare will be down for maintenance 2% of the year. During this time the well would be shut in and therefore gas and liquids would not be producing, but any liquids previously in storage tanks (FINs TK-01, TK-02, TK-03, and TK-04) would have standing losses emitted to atmosphere.

Additionally, during engine maintenance events at downstream sites the low pressure separator gas (FIN SEP-GAS) is sent to the flare (FIN FL-1) for combustion. This scenario is conservatively predicted to occur 6% of the year.

Attachment 3 contains emission rate calculations for the new air emission sources and a summary of the Site's emission rates.





ATTACHMENT 2 TCEQ FORMS AND TABLES

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table I(a) Emissions Point Summary

Permit Number: TBD RN Number: TBD Date: June 2012

Company Name: Burlington Resources Oil & Gas Company LP

Review of applications and issuance of permits will be expediated by supplying all necessary information requested on this Table

AIR CONTAMINANT DATA

EMISSION POINT DISCHARGE PARAMETERS

SHATES

		AIR CONTAMINANT DATA							EM	ISSION POIN	T DISCHARO	E PARAMET	FR S			
				3. Air Cont	aminant	4.	UTM Coord	inates of					Source			
	1. Emission	Dulina	2. Component or	Emission	Rate		Emission P	oint	5.	6.	1	7. Stack Exit l	Data		8. Fugitiv	169
			Air Contaminant Name	Pounds			East	North	Building Height	Height Abuve Ground	Diameter	Velocity	Tempera- ture	Length	Width	Asta
EPN (A)	FIN (B)	NAME (C)]	per Heur (A)	TPV (B)	Zene	(meters)	(meters)	(ft)	(ft)	(A)	(\$p0) (B)	(PF) (C)	(ft) (A)	(A) (B)	Degrees (C)
Normal Operation																
FUG	FUG	Site Fugiuves	VOC H₂S	0.40 0.0002	1.74 0.001	1.4		-	~	-	-	-	-	-	-	-
FL-I	TK-01	Controlled Condensate Tank Emissions	voc	2.62	4,24	14			-					-		-
	TK-02 TK-03		H ₂ S	0.0002	0.001											
F11	TK-04	Controlled PW Tank Emissions	voc	0.02	U.02	14		-	-	-	-	-	**	-	-	-
			H ₂ S	0.000002	0.00001			i		1						
F11	TRUCKI	Controlled Condensate Truck Loading	voc	0.97	0.36	14	-	-	-	-	-	-	-	-	-	-
FL-I	TRUCK2	Controlled Produced Water Truck Loading	voc	0.41	0.01	14	-		-	-	-	-	-	-	-	-
FL-I	FL-1	Flare Combustion mormal operations waste gas, assist, and pilot)	co	2.36	4.16	14	-		-				-	-		-
		and plant	NO _X	1.12	2.07				i							
			SO ₂	0.06	0.25				l							
	ŀ		H ₂ S	0.0004	0.002				}							
			VOC	0.03	0.06											
Scheduled Maint	enance Startup and Shutdown Even	ıs														
FL-I	SEP-GAS	Low Pressure Separator Gas to Flare	voc.	23.38	6.14	14	-		-	-	-	-	-	-	-	-
			H ₂ S	0.03	0.01											
FL-I	F()	Flare Combustion (Ip separator waste	co	22 89	6 01	14	-		-	-		-	-			-
		gas)	NO ₃	11.46	3 01											
		1	SO ₂	2.71	0.90											ł
		1	H ₂ S	0.03	0.01									1		l
			voc:	0.34	0.09									1		
TK-01	TK-0I	Uncontrolled Condensate Fank	voc	1.73	0 15	14	-	-		-		-		-		
TK-02	TK-02	Standing Loss Ermissions (during flare driwntime)	I			ŀ			I		l	1		l .		I
TK-03	TK-03	un witting [1	
TK-04	TK-44	Uncontrolled PW Tank Standing Loss Emissions (during flare downtime)	voc	1001	0.0001	14	-	~	-	-	-	-	-	-		-

ATTACHMENT 3 EMISSION RATE CALCULATIONS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TABLE 3-1
SUMMARY OF PROPOSED ALLOWABLE EMISSION RATES
PERMIT BY RULE REGISTRATION
JO ANN ESSE UNIT F1
BURLINGTON RESOURCES OIL & GAS COMPANY LP

						Propo	sed Allowa	ble Hourly	and Annua	Proposed Allowable Hourly and Annual Emission Rates	Rates			
			00	(NON	×	PM/PM ₁₀ /PM _{2.5}	₀ /PM _{2.5}	so_{2}	1,	VOC	J	HzS	
EPN	FIN	Description	(lþ/hr)	(T/yr)	(lb/hr)	(T/yr)	(Ib/hr)	(T/yr)	(Ib/hr)	(T/yr)	(lþ/hr)	(T/yr)	(lb/hr)	(T/yr)
Normal Operations	<u>ons</u>													
FUG	FUG	Site Fugitives	:	1	1	;	;	;	;	ł	0.40	1.74	0.0002	0.001
	TK-01													
FL-1	TK-02	Controlled Condensate Tank Emissions	ţ	:	;	;	:	:	;	;	2.62	4.24	0.0002	0.001
	TK-03													
FL-1	TK-04	Controlled PW Tank Emissions	ŀ	ŀ	;	;	1	:	;	;	0.02	0.02	0.000002	0.00001
FL-1	TRUCK1	Controlled Condensate Truck Loading	1	;	;	ŀ	:	;	:	:	0.97	0.36	ı	;
FL-1	TRUCK2	Controlled Produced Water Truck Loading	1	1	;	1	:	;	ŀ	;	0.41	0.01	1	:
FL-1	FL-1	Flare Combustion (normal operations waste gas, assist,	2.36	4.16	1.17	2.07	:	;	90.0	0.25	0.03	90.0	0.0004	0.002
		and prior)												
Scheduled Main	Scheduled Maintenance, Startup and Shutdown Events	Shutdown Events												
FL-1	SEP-GAS	Low Pressure Separator Gas to Flarc	;	ı	;	;	;	;	;	í	23.38	6.14	0.03	0.01
FLI	FL-1	Flare Combustion (lp separator waste gas)	22.89	6.01	11.46	3.01	:	:	2.71	06.0	0.34	60.0	0.03	0.01
TK-01	TK-01	Hannest lad Candanasta Tout Standing Lan												
TK-02	TK-02	Uncontrolled Condensale Tank Standing Loss	;	1	:	;	1	1	1	١	1.73	0.15	;	;
TK-03	TK-03	Emissions (during mare downtime)												
TV 04	TV 04	Uncontrolled PW Tank Standing Loss Emissions									100	1000		
to-04	1	(during flare downtime,	;	í	1	:	:	1	ı	ı	0.001	0.000	ı	ı
		Site-Wide Emissions:	:	10.17	ı	20.08	1	0.00	1	cI.I	1	18.71	ı	0.07

CALCULATION OF SITE FUGITIVES (FIN FUG) POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

		Emission	Annual Operating	Maximum	Maximum	Reduction	PTE	PTE VOC	PTE	PTE H ₂ S
	Number of	Factors 2	Hours	VOC*	H ₂ S	Credit "	Hourly h	Annual	Hourly b	Annual ^c
Component	Components	(lb/hr-component)	(hr/yr)	(WI%)	(wt%)	(%)	(Ib/hr)	(1/yr)	(lb/hr)	(1/yr)
Valves										
Gas Streams	48	0.00992	8,760	30%	0.04%	%0	0.14	0.63	0.0002	0.001
Light Oil	29	0.0055	8,760	100%	i	%0	0.16	0.70	ı	!
Water/Light Oil	45	0.000216	8,760	1	1	%0	0.01	0.04	1	1
<u>Pumps</u> Water/Light Oil	-	0.000052	8,760	i	ı	%0	0.0001	0.0002	ŧ	1
Flanges										
Gas Streams	70	0.00086	8,760	30%	0.04%	%0	0.02	80.0	0.00002	0.0001
Light Oil	26	0.000243	8,760	100%	i	%0	0.01	0.03	1	ı
Water/Light Oil	∞	9000000	8,760	1	1	%0	0.00005	0.0002	ı	ı
Connectors										
Gas Streams	75	0.00044	8,760	30%	0.04%	%0	0.01	0.04	0.00001	0.0001
Light Oil	09	0.000463	8,760	%001	ı	%0	0.03	0.12	1	1
Water/Light Oil	06	0.000243	8,760	1	ı	%0	0.02	0.10	t	1
						TOTAL:	0.40	1.74	0.0002	0.001

^{*} Fugitive Emission Factors and Reduction Credits are per TCEQ Technical Guidance Document for Equipment Leak Fugitives, dated October 2000. The emission factors are for total hydrocarbon, except for the emission factors associated with Water/Light Oil. As indicated on page 6 of 55 in the mentioned Guidance document, these factors are based off of a known stream constituency of 50%-99% water, and remainder VOC. Therefore, applying a VOC wt % would be double counting for the reduction due to water.

^b Hourly VOC emission rates are calculated as follows:

⁽⁴⁸ components) * (0.00992 lb/hr-component) * (30% VOC) * (100% - 0% reduction credit) = 0.14 lb/hr

^c Annual VOC emission rates are calculated as follows:

⁽⁴⁸ components) * (0.00992 lb/hr-component) * (8.760 hr/yr) * (30% VOC) * (100% - 0% reduction credit) * (2,000 lb/T) = 0.63 T/yr

SUMMARY OF TANKS SENT TO FLARE POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Flash Emissions* Working Breathing Emissions* Hourty Annual Hourty							VOC Emissions	ions					H2S Emissions	issions	
Hourty Annual Hourty Annual				Flash En	nissions²	Working Breatl	ير.ع	Uncontrol	led Total	Controlle	d Total ^d	Uncontrol	led Total	Controlle	d Total ^d
S00 bbl Condensate Storage Tanks 44.56 195.17 86.19 16.75 130.75 211.92 2.62 4.24 \$10 bbl Produced Water Storage Tank 0.77 0.05 0.05 0.01 0.08 0.07 0.07	Š	ž		Hourly	Annual	Hourly		Hourly	Annual	Hourly	Annual	Hourly	Annual		Annual
TK-01 TK-02 500 bbl Condensate Storage Tanks 44.56 195.17 86.19 16.75 130.75 211.92 2.62 4.24 TK-03 500 bbl Condensate Storage Tanks 44.56 0.95.17 86.19 16.75 0.01 0.08 0.07 0.02 0.02	EFE	ZI.	Description	(ID/hr)	(1/yr)	(ID/Nr)		(ID/hr)	(1/yr)	(ID/hr)	(I/yr)	(ID/hr)	(1/yr)	(ID/hr)	(1/yr)
TK-02 500 bbl Condensate Storage Tanks 44.56 195.17 86.19 16.75 130.75 211.92 2.62 4.24 TK-03 TK-04 500 bbl Condensate Storage Tank 0.27 0.96 0.76 0.01 0.98 0.97 0.02 0.02		TK-01													
TK-03 (10 bb) Produced Water Stream Tank 0.22 0.96 0.75 0.01 0.98 0.07 0.02 0.02	FL-1	TK-02	500 bbl Condensate Storage Tanks	44.56	195.17	86.19	16.75	130.75	211.92	2.62	4.24	0.01	0.04	0.0002	0.001
TK-04 500 bbl Produced Water Storaus Tank 0.25 0.96 0.76 0.01 0.98 0.97 0.02 0.02		TK-03													
TOTAL COST 10:0 00:0 00:0	FL-1	TK-04	TK-04 500 bbl Produced Water Storage Tank	0.22	96.0	0.76	0.01	86:0	0.97	0.02	0.02	0.0001	0.0004	0.000002 0.00001	0.00001

Notes:

VOC Flash Emissions are calculated using the WinSim stream simulation program. Data inputs included the pressurized stream data and throughputs represented in this submittal. See the pages at the end of this attachment for a printout of the data inputs

^b The Working/Breathing emissions are calculated using AP 4.2 Chapter 7 calculations with data inputs from the stream data and throughputs. See the following pages for the represented calculations.

^c The Ideal Gas Law was used to estimate the H2S emission rates using the maximum sulfur concentration in the gas coming off the tanks (200 ppm). An example calculation for hourly H2S emissions from FIN TK-04 follows:

H₂S (Ib/ht) = (% Vol H₂S in stream) * (Total Volumetric Flow of Gas, set/ht) * (1 atm STP) * (13.44, atm-set/lb-mol-K) / (298 K)

H₂S (Ib/ht) = (200 ppm / 10^c6) * (3.5 set/ht) * (1 atm) * (34.0789 Ib/lbmol H2S) / (1.314, atm-set/lb-mol-K) / (298 K)

 H_2S (lb/hr) =

d All VOC tank emissions are routed to the flare control device with a capture and control efficiency of 98%. It,S emissions are captured at 98% and then 98% converted to SO₂ during combustion.

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT PERMIT BY RULE REGISTRATION

PERMIT BY NOTE REGISTRATION JO ANN ESSE UNIT FI BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	ariable Description	Units	Vaiue
۲,	total loss = Ls + Lw	Ton/yr	See Table
, L	standing loss = 365 Vv Wv Ke Ks	lb/yr	See Table
۲m	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
Ŧ	working loss = 0.001 My Pmax Qh	Ib/hr	See Yable
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	11.05
ΦPb	Breather vent pressure range	Isd	90'0
-	Solar insolation factor	Btu/ft2-day	1521
ď	Atmospheric Pressure	psia	14.7
Ž	Vapor Molecular Weight	lb/lb-mol	94
-	Annual Average Temperature	Ļ	72.1
Τ××	Daily Maximum Ambient Temperature	ά,	541.6
TAN	Daily Minimum Ambient Temperature	ř	522.5
ΔTΔ	Daily average ambient temperature range	ň	19.1
άX	Product factor		

	L	*3°	Ē	18.	1
	تُ	Standing Loss per tank	(lb/yr)	15,131.22	9
	Ž	Tumovar	Factor	0.27	1.00
	ķ	Vented Surnover	Factor	0.11	0.98
	Å	Vapor Space Expan.	Factor	1.0933	0.0662
	ΔPv	Daily Vapor	Pressure Range	3.18790	0.02005
	W	Vapor Density	(Ib/ft3)	0.08044	0.00019
	ď	Averaga Vapor Pressure	(eiso)	11.649	0.032
	۲,	Vapor Daly Average Average Space Liquid Vapor Vapor Vapor Velume Surface Temp Pressure Denaity	ů,	539.8	539.8
	3		_	1428.4	1428.4
	ΔTv Hvo	Vapor Space Outage	£	12.63	36.75 12.63
	ΔTv	Daily Vapor Temp. Range	Ļ	36.75	36.75
		Annual	(bbl)	146,000	9,125
ecifications	ð	Max. Hourly Thruput	(pp(l/hr)	195	195
aterial Spe	Римх	Reid Vapor Max. Hourly Pressure Thruput	(baia)	11.05	0.111
2	¥		Weight	40	35
	8	Paint Selar Absorbance		95.0	9.54
		Paint	Conditions	Good	Good
ations	Color		Paint Color	Gray	Gray
Specifica	Capacity	Tank Capacity		200	500
Tarik	¥	Tank Height/ Length	2	52	22
	۵	Tank	Diameter (ft)	12	12
	H/A		Tank Type	>	>
-		No. of	Tanks	3	-
			, a	sate	

NOTE: Tank working and benching emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values.

CALCULATION OF TRUCK LOADING POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Sample Calculations for condensate

Loading Loss (lb/Mgal) = 12.46 * S * P * M / T (AP-42 Section 5.2)

Maximum Loading Loss = 12.46 * 0.60 * 11.050 * 40 / 560 - 5.900 lb/Mgal

Annual Emissions = (Annual Throughput, Mgal/yr) * (Average Loading Loss, 10 Mgal) * (1 - Control Efficiency) / (2000 1b/T Annual Emissions = (6132.00 Mgal/yr) * (5.800 1b/Mgal) * <math>(1 - 0.98) / (2000 1b/T) = 0.36 T/y.

Hourly PTE = (Hourly Throughput, Mgal/hr) * (Maximum Loading Loss, lb/Mgal) * (1 - Control Efficiency Hourly PTE = $(8.19\,\text{Mgal/yr})$ * $(5.900\,\text{lb/Mgal})$ * $(1 - 0.98) = 0.97\,\text{lb/h}$

Annual PTE (T/yr)	0.36	0.01
Hourly PTE (lb/hr)	0.97	0.41
Capture and Control Efficiency	86.0	0.98
Annual Throughput (Mgals/yr)	6,132.00	383.25
Hourly Throughput (Mgal/hr)	8.19	8.19
Average Loading Loss (lb/Mgal)	5.80	0.05
Maximum Loading Loss (lb/Mgal)	5.90	0.05
M	40	35
P @531.7 °R (psia)	10.306	0.024
P @ 560 °R (psia)	11.05	0.11
S	09:0	09:0
Facility Name	Condensate Truck Loading	Produced Water Truck Loading
EPN	FL-1	FL-1
FIN	TRUCKI	TRUCK2

Daily maximum and daily minimum ambient temperature from Tanks 4.09d for this area's annual averages (81.6 and 62.5, for average of 72.1).

Annual Average Condensate Vapor Pressure at T_{LA}:

 $\exp\{\left[(2799/(72.1+459.6)-2.227\right]\log 10(11.05)-7261/(72.1+459.6)+12.82\}$ $P = exp\{\ [\ (2799/(T+459.6) - 2.227]log10(RVP) - 7261/(T+459.6) + 12.82\}$

Annual Average Produced Water Vapor Pressure at T_{LA} : $P = \exp\{ \{ (2799/(T+459.6) - 2.227] \log 10(RVP) - 7261/(T+459.6) + 12.82 \}$ $\exp\{ \{ (2799/(72.1+459.6) - 2.227] \log 10(11.05*.01) - 7261/(72.1+459.6) + 12.82 \}$

SUMMARY OF PROCESS FLARE FUEL GAS COMBUSTION AND WASTE GAS COMBUSTION POTENTIAL TO EMIT-NORMAL OPERATIONS

PERMIT BY RULE REGISTRATION

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BURLINGTON RESOURCES OIL & GAS COMPANY LP

			Ö	00	NO_X	$\lambda_{\rm x}$	SO_2	2,	H_2S	S	200	C
EPN	FIN	Description	(lb/hr) (T/yr)	(T/yr)	(lb/hr) (T/yr)	(T/yr)	(lb/hr) (T/yr)	(T/yr)	(lb/hr) (T/yr)	(T/yr)	(lb/hr) (T/yr)	(T/yr)
FL-1	FL-1	Pilot Gas Combustion	0.01	0.04	0.003	0.01	0.001	0.002	0.0000002	_	0.0001	0.0004
FL-1	FL-1	Flare Assist Gas Combustion	0.44	1.93	0.22	96.0	0.04	0.18	0.00001	0.00004	0.01	0.04
FL-1	FL-1	Waste Gas Combustion	16.1	2.19	0.95	1.10	0.02	0.07	0.0004		0.02	0.02
		Totals:	2.36	4.16	1.17	2.07	90.0	0.25	0.0004	0.002	0.03	90.0

CALCULATION OF FLARE PILOT GAS and FLARE ASSIST GAS POTENTIAL TO EMIT

PERMIT BY RULE REGISTRATION

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BURLINGTON RESOURCES OIL & GAS COMPANY LP

					Operating			'	Emissic	Emission Rates
EPN	FIN	Description	LHV (Btu/scf)	Heat Release scf/hr	Hours (hr/yr)	Pollutant	Emission Factors	Units	Hourly a (lb/hr)	Annual ^b (T/yr)
FL-1	FL-1	Flare 1- Process	1,292	15	8,760	00	0.2755	lb/MMBtu	0.01	0.04
		Pilot Combustion				NOx	0.138	lb/MMBtu	0.003	0.01
						PM/PM ₁₀ /PM _{2.5}	°!	ı	1	;
						SO_2	200	Ppm H ₂ S	0.0005	0.002
						H ₂ S	200	Sym H2S	0.0000002	0.000001
						200	5.5	lb/MMscf	0.0001	0.0004
FL-1	FL-1	Flare 1- Process Flare Assist	1,292	1,250	8,760	00	0.2755	lb/MMBtu	0.44	1.93
		Gas Combustion				NOX	0.138	lb/MMBtu	0.22	96.0
						PM/PM ₁₀ /PM _{2.5}	۳,	1	;	1
						SO_2	200	Ppm H ₂ S	40.0	0.18
						H ₂ S	200	Ppm H ₂ S	0.00001	0.00004
						VOC	5.5	lb/MMscf	0.01	0.04

· Emission Factors for CO and NO₂ are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FL-1 follows:

CO (lb/hr) = (Heat Release, sef/hr) * (Lower Heating Value, Btu/sef) * (MM/16)*(Emission Factor, lb/MMBtu) $CO(1b/hr) = (15 \text{ scf/hr}) * (1,292 \text{ Btu/scf}) * (MM/10^6) * (0.2755 1b/MMBtu)$

lb/hr CO 0.01

The Emission Factors for SQ2 and VOC were based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows: VOC (lb/hr) = (Heat Release, sef/hr) * (MM/10 6) * (Emission Factor, lb/MMsef)

 $VOC (lb/hr) = (15 sef/hr) * (MM/10^6) * (5.5 lb/MMsef)$

lb/hr VOC 0.0001

concentration at the site is conservatively represented at 150 ppm. When used as a pilot gas or flare assist gas, 98% of this concentration will be converted to SQ, and 2% will remain A material balance approach was used to estimate the SQ and H₂S emission rates using the maximum sulfur concentration in the natural gas. As shown in Figure 5-1, KB uncombusted and unconverted. An example calculation for hourly SQ emissions for the pilot gas of EPN FL-01 follows:

SO₂ (lb/hr) = Heat Release (scfhr)*(Sulfur Coment, ppmv)*(98% conversion to SQ)*(1 lb-mol/379 scf)*(34.065 lb H2S/lb-mol)*(64.06 lb SQ/34.065 lb H2S)

SO₂ (lb/hr) = (15 scf/hr)*(200 ppm H2S)/10°6 scf gas)*(1 lb-mol/379 scf)*(98% converted to SO2)*(34.065 lb H2S/lb-mol)*(64.06 lb SO2/34.065 lb H2S)

lb/hr SO₂ 0.0005 ^h An example calculation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Hourly Emissions, lb/hr)*(Annual Operating Hours, hr/yr)*(1 T/2,000 lb)

CO(T/yr) = (0.01 lb/hr)*(8,760 hr/yr)*(1 T/2,000 lb)CO(T/yr) =

^c The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS PERMIT BY RULE REGISTRATION

BURLINGTON RESOURCES OIL & GAS COMPANY LP JO ANN ESSE UNIT FI

				Waste Ga	Waste Gas Flow Rate				Potenti	Potential to Emit
			LHV"	Hourly	Annual	:	Emission	;	Hourty	Annual
EPN	EPN FIN	Description	(Btu/scf)	(MMBtu/hr) (MMBtu/yr)	(MMBtu/yr)	Pollutant	Factors	Units	(lb/hr)	(T/yr)
FL-1	FL-1	Process Flare	2,088	6.19	15,838.60	0.0	0.2755	lb/MMBtu	1.71	2.18
		Condensate Tanks and Loading				NOx	0.1380	lb/MMBtu	0.85	1.09
						PM/PM ₁₀ /PM _{2.5}	ï	;	1	1
						so_2	9 1	ŀ	0.02	0.07
						Ris	١	1 1	0.0002	0.001
						voc	5.5	lb/MMscf	0.02	0.02
FL-1	FL-1	Process Flare	1,779	0.73	100.62	00	0.2755	lb/MMBtu	0.20	0.01
		Produced Water Tank and Loading				NOx	0.1380	lb/MMBm	0.10	0.01
						PM/PM ₁₀ /PM _{2.5}	١	1	:	ì
						SO_2	• 1	ŀ	0.0002	0.001
						H,S	3 1	1	0.0002	0.001
						VOC	5.5	Ib/MMscf	0.002	0.0002

* Waste gas stream lower heating value was taken from WinSin1 calculated stream value.

b Emission Factors for CO and NO_x are based upon the Draft TNRCC Guidance Document for Flancs and Vapor Oxidizors (dated 10/00) for non-assisted high-Bru flares. An example calculation for hourly CO emissions for EPN FI-1 follows:

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

CO(lb/hr) = (6.19 MMBtu/hr)*(0.2755 lb/MMBtu)

The Emission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

VOC (tb/n) = (1lourly Waste Gas Flow Rate, MMBurhn) / (Lower Hearing Value, Bruser) * (Emission Factor, Ib/MMscf)
VOC (tb/n) = (6,19 MMBurhn) / (2,088 bruser) * (5,5 Br/Mscf)
= | 0.02 | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | Ib/n VOC | I

· H.S. emissions are routed from the tanks to the flare and from the seperator to the flare and then converted to SO₂. SO₂ emissions rates were determined based on the combustion efficiency of 98% H₂S converted to SO₂. H₂S emissions for EPN FL-1 follows:

SO; (b/hr) = (Source It,S Emission Rate, Ib/hn) * (98% captured IL2S arream) * (98% conversion to SO; at combustion) * (1 mol II;S/34.07 ib II;S) * (64.06 ib SO2/1 mol SO; SO; (1b/hr) = (0.010 lb/hr I1]2S at Condensare Tanks) * (98%) * (98%) * (1 mol II2S/34.07 ib II2S) * (64.06 ib SO2/1 mol SO2)

^d An example calculation for annual CO emissions for EPN FL-1 follows: CO (Tyy) = (Annual Waste Gas Flow Rate, MMBta/y) * (Emission Factor, Ib-MMBtu) * (1 T / 2,000 lb) CO (Tyy) = (15,838.60 MMBta/y) * (0,2755 lb-MMBtu) * (1 T / 2,000 lb)

The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

$CALCULATION\ OF\ FLARE\ FEED\ RATES\ FROM\ FINS\ TK-01\ THROUGH\ TK-03, and\ TRUCK1$

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-01 through TK-03 and TRUCK1 Total Emissions:

 VOC Emissions (lb/hr):
 179.25

 VOC Emissions (TPY):
 229.92

 Hydrocarbon Emissions (lb/hr):
 295.55

 Hydrocarbon Emissions (TPY):
 379.09

	Heating	Condensate Tanks Flash Gas		K-03 and TRUCK1 sions ^c	Flare Fe	ed Rate ^d
Constituent	Value ^b (Btu/lb)	Weight (%)	Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.93%	47.08	60.39	1.10	2,824.29
Ethane	22,304	20.53%	60.68	77.83	1.33	3,402.40
Propane	21,646	25.62%	75.72	97.12	1.61	4,120.43
I-Butane	21,242	5.66%	16.73	21.46	0.35	893.47
N-Butane	21,293	13.74%	40.61	52.09	0.85	2,173.94
I-Pentane	21,025	4.48%	13.24	16.98	0.27	699.73
N-Pentane	21,072	4.84%	14.30	18,35	0.30	757.88
Cyelopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.35%	9.90	12.70	0.20	520.94
Cyclohexane	20,195	0.37%	1.09	1.40	0.02	55.42
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.25%	3.69	4.74	0.08	193.47
Octanes	20,747	0.38%	1.12	1.44	0.02	58.56
Nonanes	20,687	0.12%	0.35	0.45	0.01	18.25
Decanes Plus	20,638	0.32%	0.95	1.21	0.02	48.95
Benzene	18,172	0.17%	0.50	0.64	0.01	22.79
Toluene	18,422	0.22%	0.65	0.83	0.01	29.97
Ethylbenzene	18,658	0.02%	0.06	0.08	0.001	2.93
Xylenc	18,438	0.11%	0.33	0.42	0.01	15.18
	VOC	60.65%				

^a Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-01 through TK-03 on the Tank Summary table with the uncontrolled emissions
from the Condensate Truck Loading. Total Hydrocarbon Emissions were calculated as follows:

Total:

6.19

15,838.60

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)

Total HC (lb/hr) = (179.25 lb/hr) * (1 / 60.65%)

Total HC (lb/hr) =

295.55 lb/hr

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10/6

MMBtu/hr Methane = (23,861 Btu/lb) * (47.08 lb/hr) * 98% /(10^6)

MMBtu/hr Methane =

1.10 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated,

 $MMBtu/yr\ Methane-Methane\ Heating\ Value\ (Btu/lb)\ *\ Annual\ Methane\ Emissions\ (T/yr)\ *\ (2,000\ lb/T)\ *\ 98\%\ of\ stream\ is\ combusted\ /\ 10^6$

MMBtu/yr Methane = (23,861 Btu/lb) * (60.39 T/yr) * (2,000 lb/T) * 98% / (10^6)

MMBtu/yr Methane =

2,824.29 MMBtu/yr

^b Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

^c Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Condensate Flash Gas stream constituents weight percents, generated by the WinSim program.

 $^{^{\}rm d}$ An example calculation for the hourly flare feed rate for Methane is demonstrated,

CALCULATION OF FLARE FEED RATES FROM FIN TK-04 and TRUCK2

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

TK-04 and TRUCK2 Total Emissions:

 VOC Emissions (lb/hr):
 21.48

 VOC Emissions (TPY):
 1.47

 Hydrocarbon Emissions (lb/hr):
 35.28

 Hydrocarbon Emissions (TPY):
 2.41

	Heating	Produced Water Tanks Flash Gas	TK-04 and TRU	CK2 Emissions c	Flare Fe	ed Rate ^d
Constituent	Value ^b (Btu/lb)	Weight (%)	Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr)
Methane	23,861	15.69%	5.54	0.38	0.13	17.77
Ethane	22,304	20.31%	7.17	0.49	0.16	21.42
Propane	21,646	25.51%	9.00	0.61	0.19	25.88
I-Butane	21,242	5.72%	2.02	0.14	0.04	5.83
N-Butane	21,293	13.87%	4.89	0.33	0.10	13.77
I-Pentane	21,025	4.52%	1.59	0.11	0.03	4.53
N-Pentane	21,072	4.89%	1.73	0.12	0.04	4.96
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	3.38%	1.19	0.08	0.02	3.28
Cyclohexane	20,195	0.37%	0.13	0.01	0.003	0.40
Other Hexanes	20,928	0.00%	0.00	0.00	0.00	0.00
Heptanes	20,825	1.27%	0.45	0.03	0.01	1.22
Octanes	20,747	0.38%	0.13	0.01	0.003	0.41
Nonanes	20,687	0.12%	0.04	0.003	0.001	0.12
Decanes Plus	20,638	0.33%	0.12	0.01	0.002	0.40
Benzene	18,172	0.17%	0.06	0.004	0.001	0.14
Toluene	18,422	0.22%	0.08	0.01	0.001	0.36
Ethylbenzene	18,658	0.02%	0.01	0.0005	0.0002	0.02
Xylene	18,438	0.11%	0.04	0.003	0.001	0.11
	VOC	60.88%				
				Tota	l: 0. 73	100.62

^a Total VOC Emissions were determined by adding the Uncontrolled Streams for FIN TK-04 on the Tank Summary table and the uncontrolled emissions associated with the produced water loading, FIN TRUCK2. Total Hydrocarbon Emissions were calculated as follows:

Total HC (lb/hr) = VOC Emissions (lb/hr) * (1/ VOC% of stream)

Total HC (lb/hr) = (21.48 lb/hr) * (1/60.88%)

Total HC (lb/hr) =

35.28 lb/hr

MMBtw/hr Methane = Methane Heating Value (Btw/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6

MMBtu/hr Methane = $(23,861 \text{ Btu/lb}) * (5.54 \text{ lb/hr}) * 98\% / (10^6)$

MMBtu/hr Methane =

0.13 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = $(23.861 \text{ Btu/lb}) * (0.38 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98\% / (10^6)$

MMBtu/yr Methane =

17.77 MMBtu/yr

^b Heating values taken from Perry's Chemical Engineers' Handbook, Table 3-207 (pg. 3-155)

^c Emission Rates were proportioned from the Total Hydrocarbon Emissions using the Produced Water Flash Gas stream constituents weight percents, generated by the WinSim program.

^d An example calculation for the hourly flare feed rate for Methane is demonstrated.

CALCULATION OF STORAGE TANK WORKING AND BREATHING POTENTIAL TO EMIT DURING FLARE DOWNTIME-SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Variable	Variable Description	Units	Value
Ļ	total loss = Ls + Lw	Ton/yr	See Table
L _S	standing toss = 365 Vv Wv Ke Ks	lb/yr	See Table
L,w	working loss = 0.001 Mv Pv Q Kn Kp	lb/yr	See Table
Ξ.	working loss = 0.001 Mv Pmax Qh	lb/hr	See Table
	Roof Construction		Cone
RVP	Condensate Reid Vapor Pressure	psia	11.05
٩A۷	Breather yent pressure range	isd	90'0
_	Solar insolation factor	Btu/ft2-day	1521
PA	Atmospheric Pressure	psia	14.7
M۷	Vapor Molecular Weight	lom-dl/d	40
_	Annual Average Temperature	4.	72.1
TAX	Daily Maximum Ambient Temperature	A.	541.6
ν.	Daily Minimum Ambient Temperature	å	522.5
ΔTA	Daily average ambient temperature range	A.	19.1
ð	Product factor		-

Г	Г	Γ				880	_	Γ.	Ξ
l ₂	.₹	L					(Lyr)	0.15	0.0001
Ž	L ₇					Total Loss	(Ibhr)	1.73	0.001
	Łs			Standing	Loss per	tank	(Ib/yr)	302.62	1.0
	Ks		_		Vented	Vapor Sat		0.11	0.98
	å					Vapor Space	Expan. Factor	1.0933	0.0662
	νdδ						Range	3.18790	0.02005
	Α.				Vapor	Density	(ID/ft3)	0.08044	0.00019
	Q.				Average Vapor	Pressure	(psia) (ID/ft3)	11.649	0.032
	_4	Daliy	Average	Liquid	Surface	Temp	ķ	539.8	539.8
	Hvo			Vapor	Space	Outage	€	12.63	12.63
	۷ΤΔ				Daily Vapor	Temp. Range	۲	36.75	36.75
ations	ď				Max. Hourly Daily Vapor	Storage	(ppMpc)	200	200
al Specific	Pakk				Reld Vapor	Pressure	(bsia)	11.05	0.111
Materi	¥				Vapor	Molecular	Weight	40	35
	8				Paint Solar	Absorbance	Factor	0.54	0.54
						Palnt	Conditions	Cood	Good
ations	Celor						Paint Color	Gray	Gray
Specific	Capacity				Tank	Capacity	(pqq)	200	200
Tank	¥			Tank	Heleht	Length	Ē	22	52
	۵					Tank Diameter	Ē	12	12
	H/A						Tank Type	^	>
						No. of	Tanks	3	_
	-						Material	Condensate	Μd

NOTE: Tank working and breathing emissions are based on the equations found in EPA AP 42 Chapter 7. All factors used are represented in the table on this page. The Condensate Reid Vapor Pressure and Vapor Molecular Weight are determined based on the WinSim condensate stream and Off Gas stream. All other variables are found in AP 42 Chapter 7 or are default unit values. The emissions shown are due to flare maintenance occurring 2% of the year. During the flare downtime the wellhead would be shut in. Therefore there would be no condensate or produced water liquids flowing to the tanks, however any liquid already in the tanks would remain and have been maintenance. These emissions would not be controlled, as the flare is down for maintenance. The calculations shown demonstrate this alternative operating scenario regarding flare maintenance and downtime. Based on 2% downtime, this scenario is

As shown on the summary page representing the Tank Emission sent to Flare, HS emissions are represented as occuring when the liquid streams flash during the change from a pressurized flow to the almospheric tank. Due to the chemical properties of \$165, the most conservative approach is to represent that all H.S in the liquid will immediately flash, and there will be no \$16 emitted during working and breathing while the liquids are stored. Since there will be no liquid flow during the flare downtime, there are no flash emissions and therefore no \$16 emission and therefore no \$16 emission and therefore no \$16 emission are stored. emissions from the standing loss of the tanks.

being shown to occur for 175.2 hours in a year.

CALCULATION OF SEPARATOR GAS ROUTED TO FLARE POTENTIAL TO EMIT - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Potential to Emit (PTE)	Cas Stream Max VOC Max H,S Capture and Hourly Annual Hourly Annual Molecular Percentage in Control Emission Rate Emission Rate Emission Rate Emission Rate Rate (lb/lb-mol) (wt%) (wt%) Flare (%) (lb/hr) (T/yr) (lb/hr) (T/yr) (T/yr)	23.63 30% 0.04% 98% 23.38 6.14 0.03 0.01
	_	
	Gas Stream Molecular F Weight (ib/lb-mol)	23.63
	Percentage of Number of Gas Year Separator Year sent to Sen Stream to Flare Flare (M	6% 525.6 3
	Gas Throughput (MSCF/hr)	62.50
	Gas Throughput at Site (MSCF/day)	1500
	Facility Identification Number (FIN)	SEP-GAS

^a During engine maintenance at other downstream sites, the low pressure separator gas at this site may be routed to flare 6% of the year.

(Gas Throughput, MSCF/ftr.) / (379 seftb-mol) * (Gas Stream MW, Ib/lb-mol) * (Maximum VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) = (VOC Emissions, Ib/ltr)

^b Hourly VOC emission rates are calculated as follows:

 $^{(62.50 \} MSCF/ht) \ / \ (379 \ soff) \ b-mol) \ * \ (23.63 \ lb/lb-mol) \ * \ (30\%) \ * \ (100\% \ - 98\%) \ * \ (1000 \ soff) \ Mscf) \ = 23.38 \ lb/hr \ mol) \ + (1000 \ soff) \ + (1000 \ s$

c Annual VOC emission rates are calculated as follows:

⁽Gas Throughput at Site, MSCEyr) / (379 scfilb-mol) * (Gas Stream MW, Bilb-mol) * (Max VOC Percentage in Gas) * (Capture and Control Efficiency on Flare) * (1000 scfiMscf) / (2000 lb/T) = (VOC Emissions, Tyr) (32,850 MSCEyr) / (37.63 lb/lb-mol) * (23.63 lb/lb-mol) * (23.63 lb/lb-mol) * (23.63 lb/lb-mol) * (20.63 lb/lb-mol) * (20.63 lb/lb-mol) * (20.63 lb/lb-mol) * (20.64 lb/lb-mol) * (20.65 lb/lb-mol) *

PROCESS FLARE WASTE GAS COMBUSTION EMISSIONS - SMSS

PERMIT BY RULE REGISTRATION JO ANN ESSE UNIT FI

BURLINGTON RESOURCES OIL & GAS COMPANY LP

				Waste Gas	Flow Rate				Potential to Emit	l to Emit
EP	FIN	Description	LHV* (Btu/scf)	LHV ^a Hourly Annual (Btu/sc) (MMBtu/r)	Annual (MMBtu/vr)	Pollutant	Emission Factors	Units	Hourly ^b (lb/hr)	Hourly ^b Annual ^c (lb/hr) (These)
-	-	- 1	1 336	F0 50	43 551 03		9326.0	11. 0.44400	, 00 (6	(16/1)
7.	rL-1	Process Flare	566,1	83.07	45,001.93	3	0.2755	ID/MMBIII	68.77	9.01
		LP Separator Gas to Flare Event				NO_X	0.1380	lb/MMBtu	11.46	3.01
						PM/PM ₁₀ /PM _{2.5}	٠,	ì	;	ı
						50_2	°ı	;	2.71	0.90
						H ₂ S	١	ı	0.03	0.01
						VOC	5.5	lb/MMscf	0.34	60.0

^a Waste gas stream lower heating value was taken from the inlet gas analysis.

CO (lb/hr) = (Hourly Waste Gas Flow Rate, MMBtu/hr)*(Emission Factor, lb/MMBtu)

CO (lb/hr) = (83.07 MMBtu/hr)*(0.2755 lb/MMBtu)

The Emission Factors for VOC was based upon AP-42 Table 1.4-2 (dated 7/98). An example calculation for hourly VOC emissions for EPN FL-1 follows:

11; Semissions are touted from the separator to the flate and then converted to SO₂. SO₂ emission rates were determined based on the combustion efficiency of 98% H₂S converted to SO₂. H₂S emitted at the flate is 2% of SO₂ (lb/hr) = (Source H₃S Emission Rate, lb/hr) * (98% captured H2S stream) * (98% conversion to SO₂ at combustion) * (1 mol H₃S/34.07 lb H₃S) * (64.06 lb SO2/1 mol SO₂) SO₂ (lb/hr) = (1.500 lb/hr H2S off Seperator)* (98%) * (98%) * (1 mol H2S/34.07 lb H2S) * (64.06 lb SO2/1 mol SO2) the captured stream not converted by combustion. An example calculation for hourly SO₂ emissions for EPN FL-1 follows:

d An example ealeulation for annual CO emissions for EPN FL-1 follows:

CO (T/yr) = (Annual Wastc Gas Flow Rate, MMBfu/yr) * (Emission Factor, Ib/MMBtu) * (1 T / 2,000 lb) CO (T/yr) = $\frac{(43,661.93 \text{ MMBtu/yr)} * (0.2755 \text{ Ib/MMBtu}) * (1 T / 2,000 lb)}{6.01}$ T/yr CO

" The process flares are smokeless per 40 CFR §60.18 requirements; therefore, PM emissions are negligible.

b Emission Factors for CO and NO_x are based upon the Draft TNRCC Guidance Document for Flares and Vapor Oxidizers (dated 10/00) for non-assisted high-Btu flares. An example calculation for hourly CO emissions for EPN FI-1 follows:

CALCULATION OF FLARE FEED RATES FROM LP SEPARATOR - SMSS

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

 Max BD Volume (Mscf/hr)
 62.50

 Max BD Volume (Mscf/yr)
 32,850

 Gas Density (lb/scf)
 0.0625

	Heating	Inlet Gas	Separator B	D Emissions ^b	Flare Fe	ed Rate ^c
Constituent	Value ^a (Btu/lb)	Weight (%)	Hourly (lb/hr)	Annual (T/yr)	Hourly (MMBtu/hr)	Annual (MMBtu/yr
	22.041	45.0507	1.052.02	102.11	40.00	22.020.02
Methane	23,861	47.97%	1,873.83	492.44	43.82	23,030.22
Ethane	22,304	17.86%	697.66	183.34	15.25	8,014.86
Propanc	21,646	13.03%	508.98	133.76	10.80	5,674.92
f-Butane	21,242	2.61%	101.95	26.79	2.12	1,115.38
N-Butane	21,293	5.50%	214.84	56.46	4.48	2,356.32
-Pentane	21,025	2.02%	78.91	20.74	1.63	854.67
N-Pentane	21,072	2.03%	79.30	20.84	1.64	860.72
Cyclopentane	20,350	0.00%	0.00	0.00	0.00	0.00
n-Hexane	20,928	0.80%	31.25	8.21	0.64	336.77
Cyclohexane	20,195	0.32%	12.50	3.29	0.25	130.23
Other Hexanes	20,928	1.46%	57.03	14.99	1.17	614.87
Heptanes	20,825	0.82%	32.03	8.42	0.65	343.68
Octanes	20,747	0.21%	8.20	2.16	0.17	87.83
Nonanes	20,687	0.14%	5.47	1.44	0.11	58.39
Decanes Plus	20,638	0.04%	1.56	0.41	0.03	16.58
Benzene	18,172	0.09%	3.52	0.92	0.06	32.77
Foluene	18,422	0.24%	9.38	2.46	0.17	88.82
Ethylbenzene	18,658	0.02%	0.78	0.21	0.01	7.68
Xylene	18,438	0.10%	3.91	1.03	0.07	37.22
_				Totals:	83.07	43,661.93

^a Heating values taken from Perry's Chemical Engineers' Handbook , Table 3-207 (pg. 3-155)

 $Methane (lb/hr) = Maximum \ BD \ Volume \ (Mscf/hr) * Gas \ Density \ (lb/scf) * Inlet \ Gas \ Weight \% * 1000$

Methane (lb/hr) = (62.50 Mscf/hr) * (0.0625 lb/scf) * 47.97% * 1,000

Methane (lb/hr) = 1,873.83 lb/hr

MMBtu/hr Methane = Methane Heating Value (Btu/lb) * Hourly Methane Emissions (lb/hr) * 98% of stream is combusted / 10^6

MMBtu/hr Methane = $(23,861 \text{ Btu/lb}) * (1,873.83 \text{ lb/hr}) * 98% / (10^6)$

MMBtu/hr Methane = 43.82 MMBtu/hr

An example calculation for the annual flare feed rate for Methane is demonstrated.

MMBtu/yr Methane = Methane Heating Value (Btu/lb) * Annual Methane Emissions (T/yr) * (2,000 lb/T) * 98% of stream is combusted / 10^6

MMBtu/yr Methane = $(23,861 \text{ Btu/lb}) * (492.44 \text{ T/yr}) * (2,000 \text{ lb/T}) * 98% / (10^6)$

MMBtu/yr Methane = 23,030.22 MMBtu/yr

^b Constituent Emission Rates were calculated from the known maximum blowdown volumes and density then proportioned using the Inlet Gas stream constituents weight percents. An example calculation for Methane emissions is as follows:

^c An example calculation for the hourly flare feed rate for Methane is demonstrated.

DESIGN II for Windows

Simulation Result:

SOLUTION REACHED

Problem: Project:

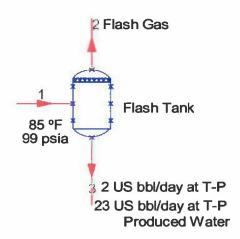
Task:

By:

At:

26-Apr-12

11:07 AM



Details for Stream 1 Stream 1 (Strm 1)

	=					
Thermodynamic Methods	K-Value:	PENG-ROB	Enthalpy:	PENG-ROB	Density:	STD
	Liquid 1 Visc:	NBS81	Liquid 1 ThC:	NBS81	Liquid 1 Den:	STD
Flowrates	Liquid 2 Visc:	STEAM	Liquid 2 ThC:	STEAM	Liquid 2 Den:	STD
riowidles						
Component Name	Total	Vapor	Liquid 1	Liquid 2	Total	K-Value
	lbmol/hr	lbmol/hr	lbmol/hr	lbmo l/hr	mole %	
16 : NITROGEN	0.0000902	0	0.00005769	0.00003251	0.00048	76.3973
49 : CARBON DIOXIDE	0.000235	0	0.00004809	0.000187	0.00125	10.619
2:METHANE 3:ETHANE	0.003948 0.003911	0 0	0.002742 0.003622	0.001207 0.000289	0.02101 0.02081	30.7589 5.34955
4 : PROPANE	0.006801	0	0.006631	0.000209	0.03619	1.50467
5 : ISOBUTANE	0.002368	0	0.00236	0.000008167	0.0126	0.624209
6 : N-BUTANE	0.007502	0	0.007482	0.00001944	0.03992	0.46863
9:2,2-DIMETHYLPROP	0	0	0	0	0	0.288569
7 : ISOPENTANE	0.005222	0	0.005217	0.000005086	0.02779	0.175808
B:N-PENTANE 54:2.2-DIMETHYLBUTA	0.007197 0	0	0.007192 0	0.000005542 0	0.0383 0	0.138973 0.07402
55 : 2,3-DIMETHYLBUTA	Ö	0	Ö	Ö	0	0.054839
52 : 2-METHYLPENTANE	0	0	0	Ö	Ō	0.04971
53 : 3-METHYLPENTANE	0	0	0	0	0	0.044482
10 : N-HEXANE	0.013807	0	0.013803	0.000003394	0.07347	0.04435
37 : METHYLCYCLOPENTA	0 000901	0	0	0	0	0.032828
10 : BENZENE 38 : CYCLOHEXANE	0.000801 0.002022	0 0	0.0008 0.002022	1.816E-07 0.000000376	0.00426 0.01076	0.040916
79 : 2-METHYLHEXANE	0.002022	0	0.002022	0.000000376	0.01076	0.03354
BO: 3-METHYLHEXANE	0	0	0	0	Ö	0.014682
11: N-HEPTANE	0.014626	0	0.014625	0.000001183	0.07783	0.01459
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.011357
41 : TOLUENE	0.003428	0	0.003427	2.169E-07	0.01824	0.011414
12 : N-OCTANE 45 : ETHYL BENZENE	0.012437 0.000832	0	0.012436 0.000832	3.367E-07 2.128E-08	0.06618 0.00443	0.004883 0.00461
43 : M-XYLENE	0.00495	0	0.00495	1.065E-07	0.02634	0.003879
42 : O-XYLENE	0	0	0	0	0	0.001809
13 : N-NONANE	0.011213	0	0.011213	1.042E-07	0.05967	0.001677
14 : N-DECANE	0.086529	0	0.086528	2.729E-07	0.46045	0.000569
62 : WATER	18.6043	0	0.000177	18.6041	99	6.53687
Total	18.7922	0	0.186166	18.606	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 Ib/hr	Total mass %	
46 : NITROGEN	0.002527	0	0.001616	0.000911	0.00071	
49 : CARBON DIOXIDE	0.010338	0	0.002117	0.008221	0.002903	
2 : METHANE	0.063342	0	0.043985	0.019357	0.017787	
3 : ETHANE	0.117586	0	0.108897	0.008688	0.033019	
4 : PROPANE	0.299879	0	0.292403	0.007476	0.084209	
5 : ISOBUTANE 3 : N-BUTANE	0.137617 0.436007	0 0	0.137143 0.434877	0.000475 0.00113	0.038644 0.122435	
: 2,2-DIMETHYLPROP	0.430007	0	0.434677	0.00113	0.122433	
: ISOPENTANE	0.376772	0	0.376405	0.000367	0.105801	
: N-PENTANE	0.519264	0	0.518864	0.0004	0.145815	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0 0	0 0	0 0	0 0	0	
52 : 2-METHYLPENTANE 53 : 3-METHYLPENTANE	0	0	0	0	0	
0 : N-HEXANE	1.18974	Ö	1.18945	0.000293	0.334092	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
io : BENZENE	0.062529	0	0.062515	0.00001418	0.017559	
38 : CYCLOHEXANE	0.170167	0	0.170135	0.00003164	0.047785	
79:2-METHYLHEXANE 80:3-METHYLHEXANE	0 0	0 0	0	0	0	
1 : N-HEPTANE	1.46549	0	1.46537	0.000119	0.411525	
9 : METHYLCYCLOHEXAN	0	Ö	0	0	0	
I1 : TOLUENE	0.315807	0	0.315787	0.00001998	0.088682	
2 : N-OCTANE	1.42057	0	1.42053	0.00003846	0.398909	
IS : ETHYL BENZENE IS : M-XYLENE	0.088378 0.525477	0 0	0.088375 0.525466	0.000002259 0.0000113	0.024817	
2 : O-XYLENE	0.525477	0	0.525466	0.0000113	0.1 475 59 0	
13 : N-NONANE	1.43811	0	1.43809	0.00001337	0.403834	
4 : N-DECANE	12.3109	0	12.3109	0.00003882	3.45704	
62 : WATER	335.162	0	0.003187	335.159	94.1169	
Total .	356.113	0	20.9061	335.207	100	

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
44 NUTROOFN	0.000450		0.000110		
46 : NITROGEN 49 : CARBON DIOXIDE	0.000158 0.000177	0 0	0.000149 0.000124	0.00000924 0.00005309	0.002746 0.003076
2 : METHANE	0.007433	Ö	0.007091	0.0003303	0.128856
3 : ETHANE	0.009449	0	0.009366	0.00008211	0.163788
4 : PROPANE	0.017198	0	0.01715	0.00004818	0.298126
5 : ISOBUTANE	0.006105	0	0.006103	0.000002321	0.105826
6 : N-BUTANE	0.019357	0	0.019351	0.000005525	0.33554
9:2,2-DIMETHYLPROP 7:ISOPENTANE	0 0.013494	0	0 0.013493	0 0.000001445	0 0.233921
8 : N-PENTANE	0.018601	Ö	0.0186	0.000001445	0.322446
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55: 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0 0	0	0	0
10: N-HEXANE 37: METHYLCYCLOPENTA	0.035699 0	0	0.035698 0	9.646E-07 0	0.61883 0
40 : BENZENE	0.00207	Ö	0.00207	5.16E-08	0.035882
38 : CYCLOHEXANE	0.005229	0	0.005228	1.068E-07	0.090635
79: 2-METHYLHEXANE	0	0	0	0	0
80: 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	0.037823	0	0.037823	3.362E-07	0.65565
39: METHYLCYCLOHEXAN 41: TOLUENE	0 0.008864	0 0	0 0.008864	0	0
12 : N-OCTANE	0.032163	0	0.032163	6.164E-08 9.568E-08	0.153659 0.557536
45 : ETHYL BENZENE	0.002153	ő	0.002153	6.047 E -09	0.037321
43 : M-XYLENE	0.012801	0	0.012801	3.025E-08	0.221903
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	0.029	0	0.029	2.962E-08	0.5027
14 : N-DECANE 62 : WATER	0.223781 5.28724	0 0	0.223781 0.000457	7.754E-08 5.28678	3.87916 91.6524
Total	5.7688	0	0.481465	5.28733	100
Flowrates					
Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
40 117700-11			0.00000044		
46 : NITROGEN 49 : CARBON DIOXIDE	0.00005021 0.000202	0	0.00003211 0.00004128	0.0000181 0.00016	0.000859 0.003448
2 : METHANE	0.003387	0	0.002352	0.001035	0.057912
3 : ETHANE	0.00529	0	0.004899	0.000391	0.09045
4 : PROPANE	0.009477	0	0.009241	0.000236	0.16204
5 : ISOBUTANE	0.00392	0	0.003906	0.00001352	0.067024
6 : N-BUTANE	0.01197	0	0.011939	0.00003102	0.204667
9 : 2,2-DIMETHYLPROP 7 : ISOPENTANE	0 0.009673	0	0 0.009663	0 0.00000942	0 0.165384
8 : N-PENTANE	0.013193	0	0.013183	0.00000942	0.105504
54: 2,2-DIMETHYLBUTA	0	0	0	0	0
55: 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE 10 : N-HEXANE	0 0.02873	0	0 0.028723	0 0.000007063	0 0.491232
37 : METHYLCYCLOPENTA	0.02873	0	0.028723	0.000007083	0.491232
40 : BENZENE	0.001134	0	0.001133	2.571E-07	0.019381
38 : CYCLOHEXANE	0.003483	0	0.003482	6.476E-07	0.059547
79: 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11: N-HEPTANE 39: METHYLCYCLOHEXAN		0	0.034143	0.000002762	0.583835
41 : TOLUENE	0.034146		Δ.	0	
	0	0	0 0.005808	0 3 676F-07	0 0.099313
12 : N-OCTANE			0 0.005808 0.032219	0 3.676E-07 8.723E-07	0.099313 0.550909
	0 0.005808	0 0	0.005808	3.676E-07	0.099313
12 : N-OCTANE 45 : ETHYL BENZENE 43 : M-XYLENE	0 0.005808 0.03222 0.001626 0.009699	0 0 0 0	0.005808 0.032219 0.001626 0.009698	3.676E-07 8.723E-07 4.155E-08 2.086E-07	0.099313 0.550909 0.027797 0.165829
12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE 42: O-XYLENE	0 0.005808 0.03222 0.001626 0.009699 0	0 0 0 0 0	0.005808 0.032219 0.001626 0.009698 0	3.676E-07 8.723E-07 4.155E-08 2.086E-07 0	0.099313 0.550909 0.027797 0.165829 0
12 : N-OCTANE 45 : ETHYL BENZENE 43 : M-XYLENE 42 : O-XYLENE 13 : N-NONANE	0 0.005808 0.03222 0.001626 0.009699 0 0.031945	0 0 0 0 0 0	0.005808 0.032219 0.001626 0.009698 0 0.031945	3.676E-07 8.723E-07 4.155E-08 2.086E-07 0	0.099313 0.550909 0.027797 0.165829 0
12 : N-OCTANE 45 : ETHYL BENZENE 43 : M-XYLENE 42 : O-XYLENE 13 : N-NONANE 14 : N-DECANE	0 0.005808 0.03222 0.001626 0.009699 0 0.031945 0.268926	0 0 0 0 0 0	0.005808 0.032219 0.001626 0.009698 0 0.031945 0.268925	3.676E-07 8.723E-07 4.155E-08 2.086E-07 0 0.000000297 0.000000848	0.099313 0.550909 0.027797 0.165829 0 0.546209 4.59818
12 : N-OCTANE 45 : ETHYL BENZENE 43 : M-XYLENE 42 : O-XYLENE 13 : N-NONANE	0 0.005808 0.03222 0.001626 0.009699 0 0.031945	0 0 0 0 0 0	0.005808 0.032219 0.001626 0.009698 0 0.031945	3.676E-07 8.723E-07 4.155E-08 2.086E-07 0	0.099313 0.550909 0.027797 0.165829 0

Properties

Temperature	F	85		
Pressure	psia	98.696		
Enthalpy	Btu/hr	-345246.5		
Entropy	Btu/hr/R	-549.6972		
Vapor Fraction		0		
•				
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18.7922	0.186166	18.606
Flowrate	lb/hr	356.1127	20.9061	335.2066
Mole Fraction		1	0.009907	0.990093
Mass Fraction		1	0.058706	0.941294
Molecular Weight		18.95	112.2982	18.016
Enthalpy	Btu/Ibmol	-18371.8148	-14752.178	-18408.0317
Enthalpy	Btu/lb	-969.4866	-131.3661	-1021.7584
Entropy	Btu/lbmol/R	-29.2514	-15.8869	-29.3851
Entropy	Btu/lb/R	-1.5436	-0.141471	-1.6311
Ср	Btu/lbmol/R		56.9172	17.9928
Ср	Btu/lb/R		0.5068	0.9987
Cv	Btu/lbmol/R		49.8785	17.7287
Cv	Btu/lb/R		0.4442	0.984
Cp/Cv			1.1411	1.0149
Density	lb/ft3		43.4219	63.3981
Z-Factor			0.043675	0.004799
Flowrate (T-P)	gal/min		0.060031	0.659242
Flowrate (STP)	gal/min		0.058973	0.670194
Specific Gravity	GPA STP cP		0.708682 0.535142	0.999863 0.807243
Viscosity Thermal Conductivity	Btu/hr/ft/R			
Surface Tension			0.067989 19.4988	0.355244 71.2853
Reid Vapor Pressure (ASTM-A)	dyne/cm	unconverged	19.4900	/1.2003
True Vapor Pressure at 100 F	psia	unconverged	73.11	
Critical Temperature (Cubic E	F	695.2244	73.11	
Critical Pressure (Cubic EOS	psia	3254.5678		
Dew Point Temperature	F	322.9413		
Bubble Point Temperature	F.	-120.2425		
Water Dew Point Temperature c				
Liquid 2 Freezing Point	F	31.9059		
Stream Vapor Pressure	psia	66.7783		
Latent Heat of Vaporization (I	Btu/lb	857.1977		
Latent Heat of Vaporization (I	Btu/lb	1091.036		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	60.65		
Heating Value (net)	Btu/SCF	56.32		
Wobbe Number	Btu/SCF	74.37		
Average Hydrogen Atoms		2.1521		
Average Carbon Atoms		0.0783		
Hydrogen to Carbon Ratio		27.4733		

Details for Stream 2 Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.00008539	0.00008539	0.00001636	0	0.827733	506.086
49 : CARBON DIOXIDE	0.00009429	0.00009429	0.000148	0	0.913919	61.6028
2 : METHANE	0.003491	0.003491	0.001745	0	33.839	193.912
3 : ETHANE	0.002412	0.002412	0.007808	0	23.3751	29.9379
4 : PROPANE 5 : ISOBUTANE	0.002065 0.000351	0.002065 0.000351	0.025989 0.011335	0 0	20.0193 3.40413	7.70283 3.00307
6 : N-BUTANE	0.000357	0.000351	0.037403	0	8.26093	2.20861
9:2,2-DIMETHYLPROP	0	0.000002	0.007400	ő	0	1.48838
7 : ISOPENTANE	0.000224	0.000224	0.028151	Ō	2.16904	0.770489
8: N-PENTANE	0.000242	0.000242	0.039178	0	2.34525	0.59861
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53: 3-METHYLPENTANE 10: N-HEXANE	0 0.00014	0 0.00014	0 0.077008	0 0	0 1. 3584	0.210746
37 : METHYLCYCLOPENTA	0.00014	0.00014	0.077006	0	0	0.176398 0.154099
40 : BENZENE	0.000007695	0.000007695	0.004468	ő	0.074586	0.166949
38 : CYCLOHEXANE	0.00001565	0.00001565	0.011306	Ō	0.151666	0.134146
79: 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE	0	0	0	0	0	0.066054
11: N-HEPTANE	0.00004512	0.00004512	0.082169	0	0.43739	0.053231
39 : METHYLCYCLOHEXAN	0	0	0	0	0	0.051298
41 : TOLUENE 12 : N-OCTANE	0.000008472	0.000008472	0.019269	0	0.082123	0.04262
45 : ETHYL BENZENE	0.00001187 7.731E-07	0.00001187 7.731E-07	0.070021 0.004687	0 0	0.115056 0.007494	0.016432 0.015987
43 : M-XYLENE	0.000003845	0.000003845	0.027874	0	0.037266	0.013337
42 : O-XYLENE	0	0	0	Ō	0	0.007514
13: N-NONANE	0.000003389	0.000003389	0.063175	0	0.032852	0.0052
14 : N-DECANE	0.000008156	0.000008156	0.487599	0	0.079056	0.001621
62 : WATER	0.000255	0.000255	0.00065	0	2.46969	37.9843
Total	0.010317	0.010317	1	0	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.002392	0.002392	0.000004	0	0.670084	
49 : CARBON DIOXIDE	0.004149	0.004149	0.000056	Ö	1.16231	
2 : METHANE	0.056007	0.056007	0.000241	0	15.6883	
3:ETHANE	0.07251	0.07251	0.002024	0	20.311	
4 : PROPANE	0.091069	0.091069	0.00988	0	25.5094	
5 : ISOBUTANE	0.020411	0.020411	0.00568	0	5.71748	
6 : N-BUTANE	0.049533	0.049533	0.01874	0	13.8748	
9 : 2,2-DIMETHYLPROP 7 : ISOPENTANE	0 0.016144	0 0.016144	0 0.01751	0 0	0 4.52223	
8 : N-PENTANE	0.017456	0.017456	0.02437	0	4.88961	
54 : 2,2-DIMETHYLBUTA	0	0	0	Ö	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53: 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	0.012076	0.012076	0.05721	0	3.38273	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.000601	0.000601	0.003008	0	0.168355	
38 : CYCLOHEXANE 79 : 2-METHYLHEXANE	0.001317 0	0.001317 0	0.008203	0	0.368848 0	
80 : 3-METHYLHEXANE	0	0	0 0	0	0	
11 : N-HEPTANE	0.004521	0.004521	0.07098	0	1.26649	
39 : METHYLCYCLOHEXAN	0.004321	0.004321	0.57556	ŏ	0	
41 : TOLUENE	0.000781	0.000781	0.01531	ō	0.218654	
12 : N-OCTANE	0.001356	0.001356	0.06895	0	0.379788	
45 : ETHYL BENZENE	0.00008207	0.00008207	0.00429	0	0.022989	
43 : M-XYLENE	0.000408	0.000408	0.02551	0	0.114327	
42 : O-XYLENE	0 000425	0	0 00005	0	0 121758	
13 : N-NONANE 14 : N-DECANE	0.000435	0.000435	0.06985	0 0	0.121758	
62 : WATER	0.00116 0.00459	0.00116 0.00459	0.5981 0.000101	0	0.325042 1.28575	
Total	0.356999	0.356999	1	0	100	
	Total VOC	0.22194007	•			

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Flowrates

riowrates					
Component Name	Total	Vapor	Liquid 1	Liquid 2	Total
	ft3/hr	ft3/hr	ft3/hr	ft3/hr	volume %
46 : NITROGEN	0.032712	0.032712	0	0	0.827733
49 : CARBON DIOXIDE	0.036118	0.036118	0	0	0 913919
2 : METHANE	1.33732	1.33732	0	0	33.839
3 : ETHANE	0.923782	0.923782	0	0	23.3751
4 : PROPANE 5 : ISOBUTANE	0.791159	0.791159	0	0	20.0193
6 : N-BUTANE	0.134531 0.326471	0.134531 0.326471	0	0 0	3. 40413 8.26093
9 : 2,2-DIMETHYLPROP	0.320471	0.320471	0	0	0.20093
7 : ISOPENTANE	0.08572	0.08572	Ö	Ö	2.16904
8 : N-PENTANE	0.092684	0.092684	0	0	2.34525
54: 2,2-DIMETHYLBUTA	0	0	0	0	0
55: 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE 37 : METHYLCYCLOPENTA	0.053684 0	0.0 53684 0	0	0	1.3584
40 : BENZENE	0.002948	0.002948	0	0	0 0.074586
38 : CYCLOHEXANE	0.005994	0.005994	0	ő	0.151666
79 : 2-METHYLHEXANE	0	0	ō	0	0
80: 3-METHYLHEXANE	0	0	0	0	0
11: N-HEPTANE	0.017286	0.017286	0	0	0.43739
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.003245	0.003245	0	0	0.082123
12 : N-OCTANE	0.004547	0.004547	0	0	0.115056
45 : ETHYL BENZENE 43 : M-XYLENE	0.000296 0.001473	0.000296 0.001473	0	0	0.007494 0.037266
42 : O-XYLENE	0.001473	0.001473	0	0	0.037200
13 : N-NONANE	0.001298	0.001298	Ö	ő	0.032852
14 : N-DECANE	0.003124	0.003124	0	0	0.079056
62 : WATER	0.097602	0.097602	0	0	2.46969
Total	3.95199	3.95199	0	0	100
Flowrales					
Component Name	Total	Vapor	Liquid 1	Liquid 2	Total
	SCF/hr	SCF/hr	SCF/hr	SCF/hr	std vol %
46 : NITROGEN	0.032406	0.032406	0	0	0.827733
49 : CARBON DIOXIDE	0.03578	0.03578	Ö	0	0.913919
2 : METHANE	1.3248	1.3248	0	0	33.839
3 : ETHANE	0.915139	0.915139	0	0	23.3751
4 : PROPANE	0.783757	0.783757	0	0	20.0193
5 : ISOBUTANE	0.133272	0.133272	0	0	3.40413
6 : N-BUTANE	0.323416	0.323416	0	0	8.26093
9 : 2,2-DIMETHYLPROP 7 : ISOPENTANE	0 0.08 49 18	0 0.084918	0 0	0 0	0 2.1 6 90 4
8 : N-PENTANE	0.091817	0.091817	0	0	2.10904
54 : 2,2-DIMETHYLBUTA	0	0	Ö	ő	0
55: 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	0.053182	0.053182	0	0	1.3584
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE 38 : CYCLOHEXANE	0.00292 0.005938	0.00292 0.005938	0	0	0.074586 0.151666
79 : 2-METHYLHEXANE	0.003938	0.005936	0	0	0.131666
80 : 3-METHYLHEXANE	Ö	0	Ö	0	0
11 : N-HEPTANE	0.017124	0.017124	Ō	Ö	0.43739
39 : METHYLCYCLOHEXAN	0	0	ō	Ō	0
41 : TOLUENE	0.003215	0.003215	0	0	0.082123
12 : N-OCTANE	0.004504	0.004504	0	0	0.115056
45 : ETHYL BENZENE	0.000293	0.000293	0	0	0.007494
43 : M-XYLENE	0.001459	0.001459	0	0	0.037266
42 : O-XYLENE	0 001386	0	0	0	0 0 0 0 0 0 0
13 : N-NONANE 14 : N-DECANE	0.001286 0.003095	0.001286 0.003095	0 0	0 0	0.032852 0.079056
62 : WATER	0.096688	0.096688	0	0	2.46969
Total	3.91501	3.91501	0	0	100
· · · · · · · ·	0.0.00	5,51001	J	U	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	5.213264	
Entropy	Btu/hr/R	0.047686213	
Vapor Fraction		1	
		Total	Vapor
Flowrate	lbmol/hr	0.010317	0.010317
Flowrate	lb/hr	0.356999	0.356999
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight		34.6041	34.6041
Enthalpy	Btu/lbmol	505.323	505.323
Enthalpy	Btu/lb	14.603	14.603
Entropy	Btu/lbmol/R	4.6222	4.6222
Entropy	Btu/lb/R	0.133575	0.133575
Ср	Btu/lbmot/R		14.5338
Cp	Btu/lb/R		0.42
Cv	Btu/lbmoi/R		12.4762
Cv	Btu/lb/R		0.3605
Cp/Cv			1.1649
Density	lb/ft3		0.090334
Z-Factor			0.990803
Flowrate (T-P)	ft3/s		0.001098
Flowrate (STP)	MMSCFD		0.00009396
Viscosity	cP		0.009488
Thermal Conductivity	Btu/hr/ft/R		0.012672
Critical Temperature (Cubic E	F	183.8238	
Critical Pressure (Cubic EOS	psia	1378.7974	
Dew Point Temperature	Ę	69.9999	
Bubble Point Temperature	F F	-259.9682	
Water Dew Point		71.5716	
Stream Vapor Pressure Vapor Sonic Velocity	psia ft/s	1136.0205	
CO2 Freeze Up	TVS	931.68	
	Dt. (00E	No 1010.00	
Heating Value (gross) Heating Value (net)	Btu/SCF	1940.02 1778.92	
• ,	Btu/SCF		
Wobbe Number	Btu/SCF	1764.79	
Average Hydrogen Atoms Average Carbon Atoms		6.4538 2.263	
Hydrogen to Carbon Ratio Methane Number		2.8518	
Motor Octane Number		41.76 99.05	
MOTOL OCTAINS NUMBER		99.05	

Details for Stream 3 Stream 3 (Produced Water)

Thermodynamic Methods K-Value: PENG-ROB STD Enthalpy: PENG-ROB Density: Liquid 1 ThC: Liquid 1 Visc: **NBS81** NBS81 Liquid 1 Den: STD Liquid 2 Visc: STEAM Liquid 2 ThC: STEAM Liquid 2 Den: STD **Flowrates** Component Name Total Vapor Liquid 1 Liquid 2 Total K-Value lbmol/hr lbmol/hr lbmol/hr mote % 46: NITROGEN 0.000004808 0.000002902 0.000001906 0.0000256 49: CARBON DIOXIDE 0.00002632 0.000114 0.000749 2: METHANE 0.000457 0.00031 0.000148 0.002434 3: ETHANE 0.001499 0 0.001385 0.000114 0.007982 4 : PROPANE 0.004736 0 0.004612 0.000124 0.025213 5: ISOBUTANE 0.002017 0.002011 0.000005233 0.010737 0 6: N-BUTANE 0.00665 Ō 0.006637 0.0000127 0.035404 9: 2,2-DIMETHYLPROP 0 7: ISOPENTANE 0.004999 0 0.004995 0.000003334 0.026614 8: N-PENTANE 0.006955 0 0.006952 0.000003605 0.037033 54:2.2-DIMETHYLBUTA O 0 n 0 0 55: 2,3-DIMETHYLBUTA 0 0 0 0 0 52: 2-METHYLPENTANE ō 0 0 Ω 53: 3-METHYLPENTANE Ō 0 10: N-HEXANE 0.013666 0.013664 0.000002088 0.072764 37: METHYLCYCLOPENTA 0 0.000793 0.000793 1 147F-07 0.004221 40 : BENZENE 0 38 : CYCLOHEXANE 0.010683 0.002006 0.002006 2.332E-07 79: 2-METHYLHEXANE 0 0 0 0 0 80: 3-METHYLHEXANE 11: N-HEPTANE 0.014581 0.01458 6.724E-07 0.077633 39: METHYLCYCLOHEXAN 0 0 41 : TOLUENE 0.003419 0.003419 1.262F-07 0.018205 0 12: N-OCTANE 0.012425 0 0.012425 1.769E-07 0.066153 ō 45 : ETHYL BENZENE 0.000832 0.000832 1.152E-08 0.004428 43: M-XYLENE 0.004946 0 0.004946 5.729E-08 0.026334 42 : O-XYLENE 13: N-NONANE 0.01121 0 0.01121 5.05E-08 0.059685 14: N-DECANE 0.08652 0 0.08652 1.215E-07 0.46066 62 : WATER 18.604 0.000115 18 6039 O 99.053 Total 18.7819 0 0.177442 18.6044 100 **Flowrates** Component Name Total Vapor Liquid 1 Liquid 2 Total lb/hr lb/hr mass % 46 : NITROGEN 0.000135 0.0000813 0.00005338 0.00003786 49: CARBON DIOXIDE 0.006188 0.00503 0.001739 2: METHANE 0.007334 0.004968 0.002367 0.002062 3: ETHANE 0.045075 0 0.041657 0.003418 0.01267 4 : PROPANE 0.20881 0.203345 0.005465 0.058695 0.032946 5: ISOBUTANE 0.117206 0 0.116902 0.000304 6: N-BUTANE 0.386474 0 0.385736 0.000738 0.108635 9: 2,2-DIMETHYLPROP 0 7: ISOPENTANE 0.360627 0 0.360387 0.000241 0.101369 8: N-PENTANE 0.501808 0 0.501548 0.00026 0.141054 54 · 2 2-DIMETHYL BUTA 0 0 0 0 0 55: 2,3-DIMETHYLBUTA 0 0 0 n 52: 2-METHYLPENTANE 0 0 0 0 0 53: 3-METHYLPENTANE 0 10: N-HEXANE 1.17767 0 1.17749 0.00018 0.331033 37: METHYLCYCLOPENTA 0 0.061928 40 : BENZENE 0 0 0.061919 0.000008956 0.017407 38 : CYCLOHEXANE 0.16885 0.16883 0.00001962 0.047462 79: 2-METHYLHEXANE 0 0 0 0 0 80: 3-METHYLHEXANE 0 11: N-HEPTANE 1.46097 0 1.4609 0.00006737 0.410667 39: METHYLCYCLOHEXAN n 0 0 0 41 : TOLUENE 0.315027 0.00001163 0.088551 0 0.315015 12 : N-OCTANE 1.41921 0 1.41919 0.0000202 0.398928 45: ETHYL BENZENE 0.088295 0 0.088294 0.000001223 0.024819 43 : M-XYLENE 0.525069 0 0.525063 0.000006082 0.147593 42: O-XYLENE 13: N-NONANE 1.43767 0 1.43766 0.000006477 0.404117 14: N-DECANE 12.3098 0 12.3098 0.00001729 3.46018 **62: WATER** 335.158 0 0.002078 335.156 94.21 Total 355.756 0 20.582 335.174 100

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Flowrates

Component Name	Total	Vapor	Liquid 1	Liquid 2	Total
	ft3/hr	ft3/hr	ft3/hr	ft3/hr	volume %
46 : NITROGEN	0.000008153	0	0.000007602	0.000000551	0.000139
49 : CARBON DIOXIDE	0.000102	ō	0.00006896	0.00003305	0.001745
2: METHANE	0.000854	0	0.000811	0.00004266	0.014608
3 : ETHANE	0.003662	0	0.003629	0.00003287	0.062656
4 : PROPANE 5 : ISOBUTANE	0.012115 0.00527	0 0	0.01208 0.005269	0.00003584 0.000001513	0.207299
6 : N-BUTANE	0.00527	0	0.005269	0.000001513	0.090173 0.297 5 17
9 : 2,2-DIMETHYLPROP	0	Ö	0	0	0
7 : ISOPENTANE	0.013085	0	0.013084	9.642E-07	0.223895
8 : N-PENTANE	0.018211	0	0.01821	0.000001043	0.311589
54 : 2,2-DIMETHYLBUTA 55 : 2,3-DIMETHYLBUTA	0 0	0 0	0 0	0 0	0
52 : 2-METHYLPENTANE	0	0	0	Ö	0
53 : 3-METHYLPENTANE	Ö	Ö	ő	Ö	ő
10 : N-HEXANE	0.035793	0	0.035792	6.038E-07	0.612426
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.002077	0 0	0.002076	3.315E-08	0.03553
38 : CYCLOHEXANE 79 : 2-METHYLHEXANE	0.005255 0	0	0.0052 5 5 0	6.742E-08 0	0.089914 0
80 : 3-METHYLHEXANE	0	0	ŏ	0	0
11 : N-HEPTANE	0.038191	0	0.038191	1.944E-07	0.653463
39: METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	0.008956	0	0.008956	3.651E-08	0.153239
12 : N-OCTANE 45 : ETHYL BENZENE	0.032545 0.002179	0	0.032545 0.002179	5.115E-08 3.331E-09	0.556853 0.037276
43 : M-XYLENE	0.012955	0	0.002179	1.657E-08	0.22167
42 : O-XYLENE	0	Ö	0	0	0
13 : N-NONANE	0.029363	0	0.029363	1.46E-08	0.502408
14 : N-DECANE	0.22663	0	0.22663	3.514E-08	3.8777
62 : WATER	5.37981	0	0.000302	5.37951	92.0499
Total	5.84445	0	0.464789	5.37966	100
Flowrates					
Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Totał std vol %
	33	33.,	3017	30 . ///	014 701 70
46 : NITROGEN	0.000002676	0	0.000001616	0.000001061	0.00004586
49 : CARBON DIOXIDE 2 : METHANE	0.000121 0.000392	0 0	0.0000226 0.000266	0.00009811 0.000127	0.002068
3 : ETHANE	0.000392	0	0.001256	0.000127	0.00672 0.034748
4 : PROPANE	0.006599	ō	0.006426	0.000173	0.113076
5 : ISOBUTANE	0.003339	0	0.00333	0.000008664	0.057207
6: N-BUTANE	0.01061	0	0.01059	0.00002026	0.181809
9 : 2,2-DIMETHYLPROP 7 : ISOPENTANE	0 0.009258	0 0	0 0.009252	0 0.000006176	0 0.1 5864 1
8 : N-PENTANE	0.01275	0	0.012743	0.000006609	0.130041
54: 2,2-DIMETHYLBUTA	0	Ō	0	0	0
55: 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE 10 : N-HEXANE	0 0.028438	0 0	0 0.028434	0 0.000004345	0 0.4873
				0.000004343	0.4073
37: METHYLCYCLOPENTA	0.020430			0	0
37 : METHYLCYCLOPENTA 40 : BENZENE		0	0 0.001122	0 1.624E-07	0 0.019237
40 : BENZENE 38 : CYCLOHEXANE	0 0.001123 0.003456	0 0 0	0 0.001122 0.003455		0.019237 0.059215
40 : BENZENE 38 : CYCLOHEXANE 79 : 2-METHYLHEXANE	0 0.001123 0.003456 0	0 0 0	0 0.001122 0.003455 0	1.624E-07 4.016E-07 0	0.019237 0.059215 0
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE	0 0.001123 0.003456 0	0 0 0 0	0 0.001122 0.003455 0	1.624E-07 4.016E-07 0 0	0.019237 0.059215 0 0
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE	0 0.001123 0.003456 0 0 0.03404	0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039	1.624E-07 4.016E-07 0 0 0.00000157	0.019237 0.059215 0 0 0.583296
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE	0 0.001123 0.003456 0	0 0 0 0	0 0.001122 0.003455 0	1.624E-07 4.016E-07 0 0	0.019237 0.059215 0 0
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE	0 0.001123 0.003456 0 0 0.03404 0 0.005794 0.032189	0 0 0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039 0 0.005794 0.032189	1.624E-07 4.016E-07 0 0 0.00000157 0 2.139E-07 4.582E-07	0.019237 0.059215 0 0 0.583296 0 0.099282 0.551577
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE	0 0.001123 0.003456 0 0 0.03404 0 0.005794 0.032189 0.001624	0 0 0 0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039 0 0.005794 0.032189 0.001624	1.624E-07 4.016E-07 0 0 0.00000157 0 2.139E-07 4.582E-07 2.25E-08	0.019237 0.059215 0 0 0.583296 0 0.099282 0.551577 0.027831
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE	0 0.001123 0.003456 0 0 0.03404 0 0.005794 0.032189 0.001624 0.009691	0 0 0 0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039 0 0.005794 0.032189 0.001624 0.009691	1.624E-07 4.016E-07 0 0.00000157 0 2.139E-07 4.582E-07 2.25E-08 1.122E-07	0.019237 0.059215 0 0 0.583296 0 0.099282 0.551577 0.027831 0.16606
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE 42: O-XYLENE	0 0.001123 0.003456 0 0 0 0.03404 0 0.005794 0.032189 0.001624 0.009691 0	0 0 0 0 0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039 0 0.005794 0.032189 0.001624 0.009691	1.624E-07 4.016E-07 0 0.000000157 0 2.139E-07 4.582E-07 2.25E-08 1.122E-07	0.019237 0.059215 0 0 0.583296 0 0.099282 0.551577 0.027831 0.16606 0
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE	0 0.001123 0.003456 0 0 0.03404 0 0.005794 0.032189 0.001624 0.009691	0 0 0 0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039 0 0.005794 0.032189 0.001624 0.009691	1.624E-07 4.016E-07 0 0.00000157 0 2.139E-07 4.582E-07 2.25E-08 1.122E-07	0.019237 0.059215 0 0 0.583296 0 0.099282 0.551577 0.027831 0.16606
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE 42: O-XYLENE 13: N-NONANE	0 0.001123 0.003456 0 0 0.03404 0 0.005794 0.032189 0.001624 0.009691 0	0 0 0 0 0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039 0 0.005794 0.032189 0.001624 0.009691 0 0.031935	1.624E-07 4.016E-07 0 0.00000157 0 2.139E-07 4.582E-07 2.25E-08 1.122E-07 0	0.019237 0.059215 0 0.583296 0 0.099282 0.551577 0.027831 0.16606 0
40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 12: N-OCTANE 45: ETHYL BENZENE 43: M-XYLENE 42: O-XYLENE 13: N-JONANE 14: N-DECANE	0 0.001123 0.003456 0 0 0.03404 0 0.005794 0.032189 0.001624 0.009691 0 0.031936 0.2689	0 0 0 0 0 0 0 0 0 0 0	0 0.001122 0.003455 0 0 0.034039 0 0.005794 0.032189 0.001624 0.009691 0 0.031935 0.2689	1.624E-07 4.016E-07 0 0.00000157 0 2.139E-07 4.582E-07 2.25E-08 1.122E-07 0 1.439E-07 3.777E-07	0.019237 0.059215 0 0.583296 0 0.099282 0.551577 0.027831 0.16606 0 0.547229 4.60772

Properties

Temperature	F	70		
Pressure	psia	14.7		
Enthalpy	Btu/hr	-350462.6		
Entropy	Btu/hr/R	-559.2596		
Vapor Fraction	Diam, I	0		
		· ·		
		Total	Liquid 1	Liquid 2
Flowrate	lbmol/hr	18.7819	0.177442	18.6044
Flowrate	lb/hr	355.7557	20.582	335.1737
Mole Fraction		1	0.009448	0.990552
Mass Fraction		1	0.057854	0.942146
Molecular Weight		18.9414	115.993	18.0158
Enthalpy	Btu/lbmol	-18659.6272	-16137.915	-18683.6783
Enthalpy	Btu/lb	-985.1216	-139.1284	-1037.0714
Entropy	Btu/lbmol/R	-29.7766	-17.9358	-29.8895
Entropy	Btu/lb/R	-1.572	-0.154628	-1.6591
Ср	Btu/lbmol/R		57.5519	17.9991
Ср	Btu/lb/R		0.4962	0.9991
Cv	Btu/lbmol/R		50.6338	17.8638
Cv	Btu/lb/R		0.4365	0.9916
Cp/Cv			1.1366	1.0076
Density	lb/ft3		44.2825	62.3039
Z-Factor			0.006775	0.0007479
Flowrate (T-P)	gal/min		0.057951	0.670754
Flowrate (STP)	gal/min		0.057565	0.670023
Specific Gravity	GPA STP		0.714752	1
Viscosity	сP		0.555862	0.975963
Thermal Conductivity	Btu/hr/ft/R		0.065905	0.346918
Surface Tension	dyne/cm		21.2845	72.5713
Reid Vapor Pressure (ASTM-A)		unconverged		
True Vapor Pressure at 100 F	psia		20.13	
Critical Temperature (Cubic I	F	695.4634		
Critical Pressure (Cubic EOS	psia	3249.6418		
Dew Point Temperature	F	211.5533		
Bubble Point Temperature	F	-120.2425		
Water Dew Point Temperature c				
Liquid 2 Freezing Point	F	31.986		
Stream Vapor Pressure	psia	14.7		
Latent Heat of Vaporization (I	Btu/lb	925.8829		
Latent Heat of Vaporization (I	Btu/lb	1063.375		
CO2 Freeze Up		No		
Heating Value (gross)	Btu/SCF	59.62		
Heating Value (net)	Btu/SCF	55.37		
Wobbe Number	Btu/SCF	73.12		
Average Hydrogen Atoms		2.1498		
Average Carbon Atoms		0.0771		
Hydrogen to Carbon Ratio		27.8701		

DESIGN II for Windows

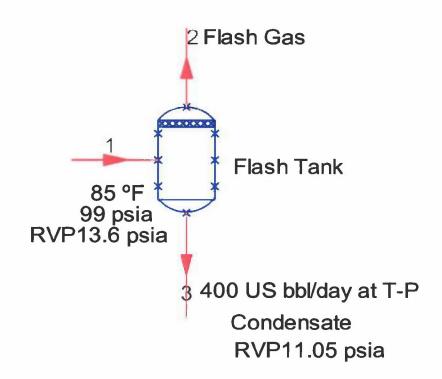
CONDENSATE SUMMARY REPORT

Simulation Result:

SOLUTION REACHED

Problem: Project: Task: By:

At: 8-Feb-12 3:05 PM



Details for Stream 1

Stream 1 (Strm 1)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 STEAM	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 STEAM	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Fiowrates	Elquid E 1100.	O727111	Equid 2 Tillo.	O1L/W	Elquid 2 Doll.	010
Component Name	Total lbmol/hr	Vapor Ibmol/hr	Liquid 1 Ibmol/hr	Liquid 2 lbmol/hr	Total mole %	K-Value
46 : NITROGEN	0.01813	0	0.01813	0	0.048001	
49 : CARBON DIOXIDE	0.047214	0	0.047214	0	0.125003	
2 : METHANE	0.793577	0	0.793577	0	2.10104	
3 : ETHANE	0.786023	0	0.786023	0	2.08104	
4 : PROPANE 5 : ISOBUTANE	1.36695	0 0	1.36695	0 0	3.61907	
6 : N-BUTANE	0.47592 1.50783	0	0.47592 1.50783	0	1.26003 3.99208	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.04967	Ö	1.04967	ő	2.77906	
8 : N-PENTANE	1.44664	0	1.44664	0	3.83008	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53: 3-METHYLPENTANE 10: N-HEXANE	0 2.77506	0	0 2.77506	0 0	0 7.34715	
37 : METHYLCYCLOPENTA	0	ŏ	0	ŏ	0	
40 : BENZENE	0.160906	0	0.160906	0	0.426009	
38 : CYCLOHEXANE	0.40642	0	0.40642	0	1.07602	
79: 2-METHYLHEXANE	0	0	0	0	0	
80 : 3-METHYLHEXANE	0	0	0	0	0	
11: N-HEPTANE 39: METHYLCYCLOHEXAN	2.93975 0	0	2.9 397 5 0	0	7.78316 0	
41 : TOLUENE	0.68895	0	0.68895	0	1.82404	
12 : N-OCTANE	2.49971	Ö	2.49971	ő	6.61813	
45 : ETHYL BENZENE	0.167327	0	0.167327	0	0.443009	
43 : M-XYLENE	0.994899	0	0.994899	0	2.63405	
42 : O-XYLENE	0	0	0	0	0	
13 : N-NONANE 14 : N-DECANE	2.25382 17.3918	0 0	2.25382 17.3918	0 0	5.96712 46.0459	
62 : WATER	0	0	0	0	46.0459	
Total	37.7706	0	37.7706	0	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.50789	0	0.50789	0	0.012061	
49 : CARBON DIOXIDE	2.07784	0	2.07784	0	0.049344	
2: METHANE	12.7313	0	12.7313	0	0.302338	
3 : ETHANE	23.6341	0	23.6341	0	0.561253	
4 : PROPANE 5 : ISDBUTANE	60.2742 27.6604	0	60.2742 27.6604	0 0	1.43136 0.656868	
6 : N-BUTANE	87.6353	0	87.6353	0	2.08113	
9 : 2,2-DIMETHYLPROP	0	Ō	0	o	0	
7:ISOPENTANE	75.7293	0	75.7293	0	1.79839	
8: N-PENTANE	104.37	0	104.37	0	2.47852	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE	0 0	0	0 0	0 0	0 0	
53: 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE	239.133	Ö	239.133	0	5.67882	
37: METHYLCYCLOPENTA	0	0	0	Ō	0	
40 : BENZENE	12.5681	0	12.5681	0	0.298461	
38 : CYCLOHEXANE	34.2027	0	34.2027	0	0.812231	
79: 2-METHYLHEXANE 80: 3-METHYLHEXANE	0	0	0	0	0 0	
11 : N-HEPTANE	294.557	0	294.557	0	6.99501	
39 : METHYLCYCLOHEXAN	0	ő	0	ő	0.93501	
41: TOLUENE	63.4757	0	63.4757	0	1.50739	
12 : N-OCTANE	285.527	0	285.527	0	6.78057	
45 : ETHYL BENZENE	17.7635	0	17.7635	0	0.421839	
43 : M-XYLENE 42 : O-XYLENE	105.618 0	0 0	105.618 0	0 0	2.50818 0	
13 : N-NONANE	289.052	0	289.052	0	6.86429	
14 : N-DECANE	2474.44	0	2474.44	0	58.7619	
62: WATER	0	Ö	0	Ö	0	
Total	4210.96	0	4210.96	0	100	

Flowrates

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.046703	0	0.046703	0	0.048001
49 : CARBON DIOXIDE	0.121623	0	0.121623	0	0.125003
2 : METHANE	2.04424	Ō	2.04424	ō	2.10104
3 : ETHANE	2.02478	0	2.02478	0	2.08104
4 : PROPANE	3.52124	0	3.52124	0	3.61907
5 : ISOBUTANE	1.22596	0	1.22596	0	1.26003
6 : N-BUTANE	3.88416	0	3.88416	0	3.99208
9 : 2,2-DIMETHYLPROP 7 : ISOPENTANE	0 2.70393	0 0	0 2.70393	0	0 2.77906
8 : N-PENTANE	3.72654	0	3.72654	0	3.83008
54 : 2,2-DIMETHYLBUTA	0	ŏ	0	ő	0
55: 2,3-DIMETHYLBUTA	0	0	0	0	0
52: 2-METHYLPENTANE	0	0	0	0	0
53: 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.14853	0	7.14853	0	7.34715
37 : METHYLCYCLOPENTA 40 : BENZENE	0 0.414492	0	0 0.414492	0	0
38 : CYCLOHEXANE	1.04693	0	1.04693	0	0.426009 1.07602
79 : 2-METHYLHEXANE	0	ő	0	ŏ	0
80 : 3-METHYLHEXANE	ō	ő	Ö	ŏ	ŏ
11 : N-HEPTANE	7.57275	0	7.57275	0	7.78316
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.77473	0	1.77473	0	1.82404
12 : N-OCTANE	6.43922	0	6.43922	0	6.61813
45 : ETHYL BENZENE 43 : M-XYLENE	0.431033 2.56285	0 0	0.431033 2.56285	0 0	0.443009 2.63405
42 : O-XYLENE	2.36263	0	2.50265	0	2.63405
13 : N-NONANE	5.80581	o	5.80581	ō	5.96712
14 : N-DECANE	44.8012	0	44.8012	0	46.0459
62 : WATER	0	0	0	0	0
Total	97.2967	0	97.2967	0	100
Flowrates					
Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/nr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.010093	0	0.010093	0	0.010574
49 : CARBON DIOXIDE	0.040531	0	0.040531	0	0.042464
2 : METHANE	0.680774	0	0.680774	0	0.713241
3 : ETHANE	1.06326	0	1.06326	0	1.11397
4 : PROPANE 5 : ISOBUTANE	1.90482 0.787885	0 0	1.90482	0	1.99567
6 : N-BUTANE	2.40592	0	0.787885 2.40592	0	0.825461 2.52066
9: 2,2-DIMETHYLPROP	0	ő	0	Ď	0
7: ISOPENTANE	1.94413	Ó	1.94413	0	2.03685
8 : N-PENTANE	2.65174	0	2.65174	0	2.77821
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE 53 : 3-METHYLPENTANE	0 0	0	0 0	0 0	0
10 : N-HEXANE	5.77455	ő	5.77455	ő	6.04995
37 : METHYLCYCLOPENTA	0	ō	0	ō	0
40 : BENZENE	0.227834	0	0.227834	0	0.2387
38 : CYCLOHEXANE	0.699994	0	0.699994	0	0.733378
79: 2-METHYLHEXANE	0	0	0	0	0
80 : 3-METHYLHEXANE	0	0	0	0	0
11: N-HEPTANE 39: METHYLCYCLOHEXAN	6.86313 0	0	6.86313 0	0 0	7.19044 0
41 : TOLUENE	1.16745	0	1.16745	0	1.22313
12 : N-OCTANE	6.47607	Ö	6.47607	ő	6,78493
45 : ETHYL BENZENE	0.326758	Ö	0.326758	ŏ	0.342341
43 : M-XYLENE	1.94936	0	1.94936	0	2.04233
42 : O-XYLENE	0	0	0	0	0
13 : N-NONANE	6.42083	0	6.42083	0	6.72705
14 : N-DECANE 62 : WATER	54.0528 0	0 0	54.0528 0	0 0	56.6307 0
					-
Totat	95.4479	0	95.4479	0	100

Properties

Temperature	F	85		
Pressure	psia	98.696		
Enthalpy	Btu/hr	-552622.5		
Entropy	Btu/hr/R	-596.2866		
Vapor Fraction		0		
		Total	Liquid 1	
Flowrate	lbmol/hr	37.7706	37.7706	
Flowrate	lb/hr	4210.9587	4210.9587	
Mole Fraction		1	1	
Mass Fraction		1	1	
Molecular Weight		111.4876	111.4876	
Enthalpy	Btu/ibmol	-14631.0071	-14631.0071	
Enthalpy	Btu/lb	-131.2344	-131.2344	
Entropy	Btu/lbmol/R	-15.787	-15.787	
Entropy	Btu/lb/R	-0.141604	-0.141604	
Ср	Btu/lbmoi/R		56.3698	
Ср	Btu/lb/R Btu/lbmol/R		0.5056	
Cv Cv	Btu/lb/R		49.3271 0.4424	
Cp/Cv	DIU/ID/K		1.1428	
Density	ib/ft3		43.2796	
Z-Factor	10/110		0.043502	
Flowrate (T-P)	gal/min		12.1313	
Flowrate (STP)	gal/min		11.9	
Specific Gravity	GPA STP		0.707396	
Viscosity	cP		0.495811	
Thermal Conductivity	Btu/hr/ft/R		0.068329	
Surface Tension	dyne/cm		19.1391	
Reid Vapor Pressure (ASTM-A	psia		13.6	
True Vapor Pressure at 100 F	psia		95.25	
Criticai Temperature (Cubic E	F	593.0848		
Critical Pressure (Cubic EOS)	psia	479.1639		
Dew Point Temperature	F	452.1604		
Bubble Point Temperature	F	107.7105		
Water Dew Point Temperature co				
Stream Vapor Pressure	psia	88.6915		
Latent Heat of Vaporization (N	Btu/lb	103.1429		
Latent Heat of Vaporization (P	Btu/lb	324.9526		
CO2 Freeze Up	D: /005	No see 5 see		
Heating Value (gross)	Btu/SCF	6065.23		
Heating Value (net)	Btu/SCF	5632.2		
Wobbe Number	Btu/SCF	2923.77		
Average Hydrogen Atoms		17.2137		
Average Carbon Atoms Hydrogen to Carbon Ratio		7.8337 2.1974		
nyulugen to Carbon Katlo		2.1974		

Details for Stream 2

Stream 2 (Flash Gas)

Thermodynamic Methods	K-Value: Vapor Visc:	PENG-ROB NBS81	Enthalpy: Vapor ThC:	PENG-ROB NBS81	Density: Vapor Den:	STD STD
Flowrates						
Component Name	Total lbmol/hr	Vapor lbmol/hr	Incipient Liquid 1 mol fra	Liquid 2 Ibmol/hr	Total mole %	K-Value
46 : NITROGEN	0.017542	0.017542	0.00001649	0	0.834113	505.969
49 : CARBON DIOXIDE	0.037023	0.037023	0.000286	0	1.76039	61.6097
2 : METHANE 3 : ETHANE	0.729743 0.501752	0.729743 0.501752	0.00179 0.00797	0	34.6984 23.8577	193,878 29,9343
4 : PROPANE	0.426897	0.426897	0.026356	0	20.2984	7.70166
5 : ISOBUTANE	0.07158	0.07158	0.011336	ō	3.40352	3.0023
6: N-BUTANE	0.173708	0.173708	0.037404	0	8.25959	2.20818
9 : 2,2-DMETHYLPROP	0	0	0	0	0	1.48838
7 : ISOPENTANE 8 : N-PENTANE	0.045604 0.04931	0.045604 0.04931	0.028151 0.039177	0 0	2.1684 2.34465	0.770284 0.598482
54 : 2,2-DIMETHYLBUTA	0.04331	0.04951	0.033177	Ö	0	0.360909
55 : 2,3-DIMETHYLBUTA	0	0	0	0	0	0.263381
52 : 2-METHYLPENTANE	0	0	0	0	0	0.236664
53 : 3-METHYLPENTANE 10 : N-HEXANE	0 0.028557	0 0.028557	0 0.077003	0 0	0 1,35784	0.210746
37 : METHYLCYCLOPENTA	0.028557	0.026557	0.077003	0	0	0.176335 0.154099
40 : BENZENE	0.001569	0.001569	0.004467	ŏ	0.074591	0.166971
38 : CYCLOHEXANE	0.003189	0.003189	0.011305	0	0.151648	0.134139
79: 2-METHYLHEXANE	0	0	0	0	0	0.065693
80 : 3-METHYLHEXANE 11 : N-HEPTANE	0 0.00 9 194	0 0.009194	0 0.082163	0 0	0	0.066054
39 : METHYLCYCLOHEXAN	0.005194	0.009194	0.082183	0	0.437172 0	0.053208
41 : TOLUENE	0.001727	0.001727	0.019267	ō	0.082116	0.042619
12 : N-OCTANE	0.002418	0.002418	0.070016	0	0.114983	0.016422
45 : ETHYL BENZENE	0.000158 0.000784	0.000158	0.004687	0	0.007493	0.015986
43 : M-XYLENE 42 : O-XYLENE	0.000784	0.0007 84 0	0. 02787 2 0	0 0	0.037259 0	0.013368 0.007514
13 : N-NONANE	0.00069	0.00069	0.06317	ő	0.032827	0.007374
14 : N-DECANE	0.001661	0.001661	0.487563	0	0.078988	0.00162
62 : WATER	0	0	0	0	0	0.024719
Total	2.10311	2.10311	1	0	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Incipient Liquid 1 mass fra	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.491419	0.491419	0.000004	0	0.668823	
49 : CARBON DIOXIDE	1.62933	1.62933	0.000108	0	2.21753	
2 : METHANE	11.7073	11.7073	0.000248	0	15.9336	
3 : ETHANE 4 : PROPANE	15.0867 18.8236	15.0867 18.8236	0.002066 0.01002	0 0	20.533 25.619	
5 : ISOBUTANE	4.16021	4.16021	0.00568	0	5.66206	
6 : N-BUTANE	10.0959	10.0959	0.01874	Ö	13.7406	
9 : 2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	3.29012	3.29012	0.01751	0	4.47787	
8 : N-PENTANE 54 : 2.2-DIMETHYLBUTA	3.55755 0	3.55 7 55 0	C.02437 0	0	4. 84185 0	
55 : 2,3-DIMETHYLBUTA	0	Ö	Ö	ŏ	Ö	
52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	0	0	0	0	
10 : N-HEXANE 37 : METHYLCYCLOPENTA	2.46079 0	2.46079 0	0.0572 0	0 0	3.34914 0	
40 : BENZENE	0.12253	0.12253	0.003008	0	0.166763	
38 : CYCLOHEXANE	0.2684	0.2684	0.008202	0	0.365294	
79 : 2-METHYLHEXANE	0	0	0	0	0	
BO : 3-METHYLHEXANE	0	0	0	0	0	
11 : N-HEPTANE 39 : METHYLCYCLOHEXAN	0.921238 0	0.921238 0	0.07097 0	0	1.25381 0	
41 : TOLUENE	0.159114	0.159114	0.0153	0	0.216554	
12 : N-OCTANE	0.276218	0.276218	0.06894	Ö	0.375934	
45 : ETHYL BENZENE	0.016728	0.016728	0.004289	0	0.022767	
43 : M-XYLENE	0.083187	0.083187	0.02551	0	0.113217	
42 : O-XYLENE 13 : N-NONANE	0 0.088541	0 0.088541	0 0.06984	0 0	0 0.120505	
14 : N-DECANE	0.236348	0.236348	0.598	0	0.120505	
62 : WATER	0	0	0	Ö	0	
Total	73.4752 Total VOC	73.4752 44.560474	1	0	100	

F	lo	WI	at	tes

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	6.72135	6.72135	0	0	0.834113
49 : CARBON DIOXIDE	14.1854	14.1854	Ö	0	1.76039
2 : METHANE	279.602	279.602	0	Ö	34.6984
3 : ETHANE	192.247	192.247	0	0	23.8577
4 : PROPANE	163.566	163.566	0	0	20.2984
5 : ISOBUTANE	27.4258	27.4258	0	0	3.40352
6 : N-BUTANE 9 : 2,2-DIMETHYLPROP	66.5565 0	66.5565 0	0 0	0 0	8.25959 0
7 : ISOPENTANE	17.4731	17. 47 31	ő	0	2.1684
8 : N-PENTANE	18.8934	18.8934	ō	ŏ	2.34465
54: 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMÉTHYLBUTA	0	0	0	0	0
52 : 2-METHYLPENTANE	0	0	0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10: N-HEXANE 37: METHYLCYCLOPENTA	10.9416	10.9416	0	0	1.35784
40 : BENZENE	0 0.601058	0 0.601058	0 0	0	0 0.074591
38 : CYCLOHEXANE	1.22199	1.22199	0	ő	0.151648
79 : 2-METHYLHEXANE	0	0	ŏ	ŏ	0
80: 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	3.52276	3.52276	0	0	0.437172
39 : METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE 12 : N-OCTANE	0.661696	0.661696	0	0	0.082116
45 : ETHYL BENZENE	0.926542 0.060376	0.926542 0.060376	0	0	0.114983 0.007493
43 : M-XYLENE	0.300236	0.300236	n	0	0.037259
42 : O-XYLENE	0	0.000200	ő	0	0.007200
13: N-NONANE	0.264521	0.264521	0	0	0.032827
14 : N-DECANE	0.636488	0.636488	0	0	0.078988
62 : WATER	0	0	0	0	0
Total	805.808	805.808	0	0	100
Flowrates					
Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
Component Name 46 : NITROGEN					std vol %
·	SCF/hr	SCF/hr	SCF/hr	SCF/hr	
46 : NITROGEN 49 : CARBON DIOXIDE 2 : METHANE	SCF/hr 6.657 14.0496 276.925	SCF/hr 6.657 14.0496 276.925	SCF/hr 0 0 0	SCF/hr 0 0 0	std vol % 0.834113
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE	SCF/hr 6.657 14.0496 276.925 190.406	SCF/hr 6.657 14.0496 276.925 190.406	SĊF/hr 0 0 0 0	SĊF/hr 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE	SCF/hr 6.657 14.0496 276.925 190.406 162	SCF/hr 6.657 14.0496 276.925 190.406 162	SCF/hr 0 0 0 0 0	SCF/hr 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633	SCF/hr 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192	SCF/hr 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633	SCF/hr 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP	SCF/hr 6 657 14,0496 276.925 190.406 162 27.1633 65.9192 0	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0	SCF/hr 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 8: N-PENTANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPUTANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 53: 3-METHYLPENTANE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0	SCF/hr 6 657 14 0496 276 925 190 406 162 27 1633 65 9192 0 17 3058 18 7125 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2-METHYLPENTANE 53: 3-METHYLPENTANE 10: N-HEXANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 10.8368	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 53: 3-METHYLPENTANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 53: 3-METHYLPENTANE 10: N-MEXANE 37: METHYLCYCLOPENTA	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 10.8368	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2: 2-METHYLPENTANE 53: 3-METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304	SCF/hr 6 657 14 0496 276 925 190 406 162 27 1633 65 9192 0 17 3058 18 7125 0 0 0 10 8368 0 0 595304	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784 0 0.074591
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2: 2-METHYLPENTANE 10: N-HEXANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 0 10.8368 0 0.595304 1.21029 0 0	SCF/hr 6 657 14 0496 276 925 190 406 162 27 1633 65 9192 0 17 3058 18 7125 0 0 0 10 8368 0 0 595304 1,21029 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784 0 0.074591 0.151648 0 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE 10: N-HEXANE 17: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 10: 3-METHYLHEXANE 10: N-HETHYLHEXANE 10: N-HETHYLHEXANE 11: N-HEPTANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784 0 0.074591 0.151648 0 0 0.437172
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 50: 2-METHYLPENTANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 80: 3-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904 0	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 1.35784 0 0.074591 0.151648 0 0 0.437172
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 84: PROPANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 56: 2,3-DIMETHYLPENTANE 10: N-HEXANE 10: N-HEXANE 30: CYCLOHEXANE 30: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904 0 0.65536	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 0.595304 1.21029 0 0.3.48904 0 0.655536	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 0.074591 0.151648 0 0 0.437172 0 0.082116
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 3-3-METHYLPENTANE 10: N-HEXANE 10: N-HEXANE 37: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 10: N-HETHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 11: N-HEPTANE 39: METHYLCYCLOHEXAN 11: TOLUENE 12: N-OCTANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904 0 0.65536	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904 0 0.65536 0.917671	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784 0 0.074591 0.151648 0 0.437172 0 0.082116 0.114983
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 84: PROPANE 54: 2,2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 56: 2,3-DIMETHYLPENTANE 10: N-HEXANE 10: N-HEXANE 30: CYCLOHEXANE 30: 2-METHYLHEXANE 80: 3-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904 0 0.65536	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 0.595304 1.21029 0 0.3.48904 0 0.655536	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 0.074591 0.151648 0 0 0.437172 0 0.082116
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 8: N-PENTANE 52: 2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 3-METHYLPENTANE 10: N-HEXANE 17: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 11: N-HEPTANE 12: METHYLCYCLOHEXAN 11: N-HEPTANE 12: N-OCTANE 45: ETHYL BENZENE 45: M-XYLENE 46: M-XYLENE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 0 3.48904 0 0.65536 0.917671 0.059798 0.297362 0	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 3.48904 0 0.65536 0.917671 0.059798 0.297362 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0 1.35784 0 0.074591 0.151648 0 0 0.437172 0 0.082116 0.114983 0.007493 0.037259 0
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 8: N-PENTANE 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLPENTANE 10: N-HEXANE 10: N-HEXANE 10: N-HEXANE 17: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 39: METHYLCYCLOHEXAN 41: TOLUENE 42: N-XYLENE 43: M-XYLENE 44: N-XYLENE 42: O-XYLENE 41: N-NONANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 0 3.48904 0 0.65536 0.917671 0.059798 0.297362 0 0.261988	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 0.348904 0 0.65536 0.917671 0.059798 0.297362 0 0.261988	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0.74591 0.151648 0 0.074591 0.151648 0 0.082116 0.1437172 0 0.082116 0.1437259 0.037259 0 0.037259
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 84: P.2-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 50: 3-METHYLPENTANE 10: N-HEXANE 10: N-HEXANE 10: N-HEXANE 11: N-HEYANE 80: 3-METHYLCYCLOPENTA 40: BENZENE 80: 3-METHYLHEXANE 11: N-HEPTANE 11: N-HEPTANE 11: N-HEPTANE 11: N-HEPTANE 11: N-OCTANE 12: N-OCTANE 14: TOLUENE 12: N-OCTANE 43: M-XYLENE 44: O-XYLENE 41: N-NONANE 11: N-NONANE	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 0.595304 1.21029 0 0.3.48904 0 0.65536 0.917671 0.059798 0.297362 0 0.261988 0.630394	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 0.595304 1.21029 0 0.65536 0.917671 0.059798 0.297362 0 0.261988 0.630394	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0.74591 0.151648 0 0.437172 0.082116 0.114983 0.007493 0.037259 0 0.032827 0.078988
46: NITROGEN 49: CARBON DIOXIDE 2: METHANE 3: ETHANE 4: PROPANE 5: ISOBUTANE 6: N-BUTANE 9: 2,2-DIMETHYLPROP 7: ISOPENTANE 8: N-PENTANE 8: N-PENTANE 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLBUTA 55: 2,3-DIMETHYLPENTANE 10: N-HEXANE 10: N-HEXANE 10: N-HEXANE 17: METHYLCYCLOPENTA 40: BENZENE 38: CYCLOHEXANE 79: 2-METHYLHEXANE 11: N-HEPTANE 39: METHYLCYCLOHEXAN 41: TOLUENE 39: METHYLCYCLOHEXAN 41: TOLUENE 42: N-XYLENE 43: M-XYLENE 44: N-XYLENE 42: O-XYLENE 41: N-NONANE	SCF/hr 6 657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 0 3.48904 0 0.65536 0.917671 0.059798 0.297362 0 0.261988	SCF/hr 6.657 14.0496 276.925 190.406 162 27.1633 65.9192 0 17.3058 18.7125 0 0 0 10.8368 0 0.595304 1.21029 0 0.348904 0 0.65536 0.917671 0.059798 0.297362 0 0.261988	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SCF/hr 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	std vol % 0.834113 1.76039 34.6984 23.8577 20.2984 3.40352 8.25959 0 2.1684 2.34465 0 0 0.74591 0.151648 0 0.074591 0.151648 0 0.437172 0 0.082116 0.114983 0.007493 0.037259 0 0.032827

Properties

Temperature Pressure Enthalpy Entropy Vapor Fraction	F psia Btu/hr Btu/hr/R	70 14.7 1068.573 9.486216 1	
		Total	Vapor
Flowrate	lbmal/hr	2.1031	2.1031
Flowrate	lb/hr	73.4752	73.4752
Mole Fraction		1	1
Mass Fraction		1	1
Molecular Weight	-	34.9365	34.9365
Enthalpy	Btu/lbmol	508.0927	508.0927
Enthalpy	Btu/lb	14.5433	14.5433
Entropy	Btu/lbmol/R	4.5106	4.5106
Entropy	Btu/lb/R	0.129108	0.129108
Cp	Btu/lbmol/R		14.5903
Cp Cv	Btu/lb/R Btu/lbmol/R		0.4176 12.534
Cv	Btu/lb/R		0.3588
Cp/Cv	Blumbill		1.1641
Density	lb/ft3		0.091182
Z-Factor	ID/IIO		0.99102
Flowrate (T-P)	ft3/s		0.223836
Flowrate (STP)	MMSCFD		0.019154
Viscosity	cP		0.009578
Thermal Conductivity	Btu/hr/ft/R		0.012708
Critical Temperature (Cubic E	F	173.1526	
Critical Pressure (Cubic EOS)	psia	1347.8257	
Dew Point Temperature	F	70.0076	
Bubble Point Temperature	F	-259.4223	
Water Dew Point Temperature	could not be calcul	lated	
Stream Vapor Pressure	psia	1142.0302	
Vapor Sonic Velocity	ft/s	927.11	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	1964.1	
Heating Value (net)	Btu/SCF	1800.85	
Wobbe Number	Btu/SCF	1778.4	
Average Hydrogen Aloms		6.4895	
Average Carbon Atoms		2.2979	
Hydrogen to Carbon Ratio		2.8241	
Methane Number		41.29	
Motor Octane Number		98.76	

Details for Stream 3

Stream 3 (Condensate)

Thermodynamic Methods	K-Value: Liquid 1 Visc: Liquid 2 Visc:	PENG-ROB NBS81 NBS81	Enthalpy: Liquid 1 ThC: Liquid 2 ThC:	PENG-ROB NBS81 NBS81	Density: Liquid 1 Den: Liquid 2 Den:	STD STD STD
Flowrates		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			,	
Component Name	Total lbmol/hr	Vapor Ibmol/hr	Liquid 1 Ibmol/hr	Liquid 2 Ibmol/hr	Total mole %	K-Value
46 : NITROGEN	0.000588	0	0.000588	0	0.001649	
49 : CARBON DIOXIDE	0.010191	0	0.010191	0	0.028573	
2 : METHANE	0.063834	0	0.063834	0	0.17897	
3 : ETHANE 4 : PROPANE	0.284271 0.94005	0	0.284271 0.94005	0	0.797002 2.63559	
5 : ISOBUTANE	0.40434	0	0.40434	ő	1.13364	
6: N-BUTANE	1.33413	ō	1.33413	ō	3.74045	
9:2,2-DIMETHYLPROP	0	0	0	0	0	
7 : ISOPENTANE	1.00406	0	1.00406	0	2.81506	
8 : N-PENTANE	1.39733	0	1.39733	0	3.91766	
54 : 2,2-DIMETHYLBUTA	0 0	0	0 0	0 0	0 0	
55 : 2,3-DIMETHYLBUTA 52 : 2-METHYLPENTANE	0	0	0	0	0	
53 : 3-METHYLPENTANE	0	Ď	ŏ	ŏ	ő	
10 : N-HEXANE	2.74651	0	2.74651	Ö	7.7003	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	0.159337	0	0.159337	0	0.44673	
38 : CYCLOHEXANE	0.403231	0	0.403231	0	1.13053	
79 : 2-METHYLHEXANE	0	0	0	0 0	0 0	
80 : 3-METHYLHEXANE 11 : N-HEPTANE	0 2.93055	0	0 2.93055	0	8.21631	
39 : METHYLCYCLOHEXAN	0	0	0	ő	0.21031	
41 : TOLUENE	0.687223	ő	0.687223	Ō	1.92675	
12 : N-OCTANE	2.49729	0	2.49729	0	7.00158	
45 : ETHYL BENZENE	0.16717	0	0.16717	0	0.468689	
43 : M-XYLENE	0.994115	0	0.994115	0	2.78717	
42 : O-XYLENE 13 : N-NONANE	0 2.25313	0	0 2.25313	0 0	0	
14 : N-DECANE	17.3902	0	17.3902	0	6.31703 48.7563	
62 : WATER	0	ō	0	ő	0	
Total	35.6675	0	35.6675	0	100	
Flowrates						
Component Name	Total lb/hr	Vapor lb/hr	Liquid 1 lb/hr	Liquid 2 lb/hr	Total mass %	
46 : NITROGEN	0.016472	0	0.016472	0	0.000398	
49 : CARBON DIOXIDE	0.448511	0	0.448511	Ō	0.01084	
2 : METHANE	1.02409	0	1.02409	0	0.024751	
3 : ETHANE	8.54746	0	8.54746	0	0.206586	
4 : PROPANE 5 : ISQBUTANE	41.4506 23.5002	0	41.4506 23.5002	0	1.00183	
6 : N-BUTANE	77.5394	0	77.5394	0	0.567984 1.87407	
9:2,2-DIMETHYLPROP	0	o O	0	ő	0	
7 : ISOPENTANE	72.4392	0	72.4392	0	1.7508	
8 : N-PENTANE	100.812	0	100.812	0	2.43655	
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0	
55 : 2,3-DIMETHYLBUTA 52 : 2-METHYLPENTANE	0	0 0	0	0 0	0 0	
53 : 3-METHYLPENTANE	0	0	0 0	0	0	
10 : N-HEXANE	236.672	0	236.672	ŏ	5.72019	
37 : METHYLCYCLOPENTA	0	0	0	0	0	
40 : BENZENE	12.4455	0	12.4455	0	0.300799	
38 : CYCLOHEXANE	33.9343	0	33.9343	0	0.820168	
79: 2-METHYLHEXANE 80: 3-METHYLHEXANE	0 0	0	0 0	0	0	
11 : N-HEPTANE	293.636	0	293.636	0	7.09696	
39 : METHYLCYCLOHEXAN	0	ő	0	ő	0	
41 : TOLUENE	63.3166	0	63.3166	0	1.53032	
12 : N-OCTANE	285.251	0	285.251	0	6.89431	
45 : ETHYL BENZENE	17.7467	0	17.7467	0	0.428926	
43 : M-XYLENE 42 : O-XYLENE	105.535 0	0	105.535 0	0 0	2.55071 0	
13 : N-NONANE	288.964	0	288.964	0	6.98405	
14 : N-DECANE	2474.2	ő	2474.2	ő	59.7998	
62 : WATER	0	0	0	0	0	
Total	4137.48	0	4137.48	0	100	

F	low	πа	tes

Component Name	Total ft3/hr	Vapor ft3/hr	Liquid 1 ft3/hr	Liquid 2 ft3/hr	Total volume %
46 : NITROGEN	0.001541	0	0.001541	0	0.001649
49 : CARBON DIOXIDE	0.026703	Ō	0.026703	Ö	0.028573
2 : METHANE	0.167256	0	0.167256	0	0.17897
3 : ETHANE	0.744836	0	0.744836	0	0.797002
4 : PROPANE	2.46308 1.05944	0	2.46308 1.05944	0	2.63559
5 : ISOBUTANE 6 : N-BUTANE	1.05944 3.49563	0	1.05944 3.49563	0	1.13364 3.74045
9 : 2,2-DIMETHYLPROP	0.49303	0	0	0	3.74043
7 : ISOPENTANE	2.63081	Ö	2.63081	ō	2.81506
8 : N-PENTANE	3.66124	0	3.66124	0	3.91766
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55 : 2,3-DIMETHYLBUTA 52 : 2-METHYLPENTANE	0 0	0	0 0	0	0
53 : 3-METHYLPENTANE	0	0	0	0	0
10 : N-HEXANE	7.19629	ő	7.19629	ő	7.7003
37: METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.41749	0	0.41749	0	0.44673
38 : CYCLOHEXANE	1.05653	0	1.05653	0	1.13053
79 : 2-METHYLHEXANE 80 : 3-METHYLHEXANE	0	0	0	0	0
11 : N-HEPTANE	7.67852	0	7.67852	0	8.21631
39 : METHYLCYCLOHEXAN	0	ő	0	ő	0.21031
41 : TOLUENE	1.80064	0	1.80064	0	1.92675
12: N-OCTANE	6.54331	0	6.54331	0	7.00158
45 : ETHYL BENZENE	0.438012	0	0.438012	0	0.468689
43 : M-XYLENE 42 : O-XYLENE	2.60474 0	0	2.60474 0	0	2.78717 0
13 : N-NONANE	5.90356	0	5.90356	0	6.31703
14 : N-DECANE	45.5651	Ö	45.5651	ŏ	48.7563
62 : WATER	0	0	0	0	0
Total	93,4547	0	93.4547	0	100
Flowrates					
Component Name	Total SCF/hr	Vapor SCF/hr	Liquid 1 SCF/hr	Liquid 2 SCF/hr	Total std vol %
46 : NITROGEN	0.000327	0	0.000327	0	0.000353
49 : CARBON DIOXIDE	0.008749	0	0.008749	Ö	0.009425
2 : METHANE	0.05476	0	0.05476	0	0.05899
3 : ETHANE	0.384537	0	0.384537	0	0.41424
4 : PROPANE	1.30995	0	1.30995	0	1.41113
5 : ISOBUTANE 6 : N-BUTANE	0.669385 2.12875	0	0.669385 2.12875	0	0.721091 2.29318
9 : 2,2-DIMETHYLPROP	0	0	2.12073	0	2.29310
7 : ISOPENTANE	1.85967	Ŏ	1.85967	ō	2.00332
8 : N-PENTANE	2.56135	0	2.56135	0	2.7592
54 : 2,2-DIMETHYLBUTA	0	0	0	0	0
55: 2,3-DIMETHYLBUTA 52: 2-METHYLPENTANE	0 0	0	0	0	0
53 : 3-METHYLPENTANE	Ö	0	0	0	0
10 : N-HEXANE	5.71513	0	5.71513	ō	6.15659
37 : METHYLCYCLOPENTA	0	0	0	0	0
40 : BENZENE	0.225613	0	0.225613	0	0.24304
38 : CYCLOHEXANE 79 : 2-METHYLHEXANE	0.694501	0	0.694501	0	0.748147
80 : 3-METHYLHEXANE	0	0	0 0	0 0	0
11 : N-HEPTANE	6.84166	ő	6.84166	ő	7.37014
39: METHYLCYCLOHEXAN	0	0	0	0	0
41 : TOLUENE	1.16452	0	1.16452	0	1.25448
12: N-OCTANE	6.46981	0	6.46981	0	6.96956
45 : ETHYL BENZENE 43 : M-XYLENE	0.32645 1.94783	0	0.32645 1.94783	0 0	0.351666 2.09828
42 : O-XYLENE	0	Ö	0	0	2.09020
13 : N-NONANE	6.41886	ő	6.41886	ŏ	6.91468
14: N-DECANE	54.0476	0	54.0476	0	58.2225
62 : WATER	0	0	0	0	0
Total	92.8295	0	92.8295	0	100

Properties

Temperature	F	70	
Pressure	psia	14.7	
Enthalpy	Btu/hr	-575446.1	
Entropy	Btu/hr/R	-639.7209	
Vapor Fraction		0	
		Total	Liquid 1
Flowrate	lbmol/hr	35.6675	35.6675
Flowrate	lb/hr	4137.4836	4137.4836
Mole Fraction		1	1
Mass Fraction Molecular Weight		1 116.0014	1 116.0014
Enthalpy	Btu/fbmol	-16133.6115	-16133.611
Enthalpy	Btu/lb	-139.0812	-139.0812
Entropy	Btu/lbmol/R	-17.9357	-17.9357
Entropy	Btu/lb/R	-0.154616	-0.154616
Ср	Btu/lbmol/R	-0.154010	57.4199
Cp	Btu/lb/R		0.495
Cv	Btu/lbmol/R		50.5021
Cv	Btu/lb/R		0.4354
Cp/Cv			1.137
Density	lb/ft3		44.2726
Z-Factor			0.006777
Flowrate (T-P)	gal/min		11.6522
Flowrate (STP)	gal/min		11.5735
Specific Gravity	GPA STP		0.714658
Viscosity	cP		0.515961
Thermal Conductivity	Btu/hr/ft/R		0.065866
Surface Tension	dyne/cm		21.2374
Reid Vapor Pressure (ASTM-A	psia		11.05
True Vapor Pressure at 100 F	psia F	500.0774	19.47
Critical Temperature (Cubic El Critical Pressure (Cubic EOS)		599.2774 431.1843	
Dew Point Temperature	psia F	308.9403	
Bubble Point Temperature	F	69.9748	
Water Dew Point Temperature of			
Stream Vapor Pressure	Osia Carco	14.7	
Latent Heat of Vaporization (N	Btu/lb	129.9117	
Latent Heat of Vaporization (P	Btu/lb	259.9742	
CO2 Freeze Up		No	
Heating Value (gross)	Btu/SCF	6307.05	
Heating Value (net)	Btu/SCF	5858.11	
Wobbe Number	Btu/SCF	2964.64	
Average Hydrogen Atoms		17.8461	
Average Carbon Atoms		8.1601	
Hydrogen to Carbon Ratio		2.187	

ATTACHMENT 4 QUALIFICATION FOR PERMIT BY RULE

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

ATTACHMENT 4 QUALIFICATION FOR PERMIT BY RULE

Jo Ann Esse Unit F1 (Referred to as "the Site") Located in Live Oak County

Burlington Resources Oil & Gas Company LP (Burlington Resources) is submitting this registration to authorize three (3) controlled atmospheric condensate storage tanks and associated loading, one (1) controlled atmospheric produced water storage tank and associated loading, one (1) flare combustion control device, and piping and fugitive components (the Project) at the Site. This attachment discusses how the Site will meet the general Permit By Rule (PBR) requirements codified in Title 30 of the Texas Administrative Code (30 TAC) §106.4 and the specific PBR requirements codified in 30 TAC §106.352 and 30 TAC §106.492. Copies of these PBR rules are located in Attachment 5 of this PBR registration.

30 TAC §106.4, effective May 15, 2011

30 TAC §106.4(a)(1)

This paragraph states that total actual emissions authorized under permit by rule from the facility shall not exceed 250 tons per year (tpy) of carbon monoxide (CO) or nitrogen oxides (NO_X); or 25 tpy of volatile organic compounds (VOC) or sulfur dioxide (SO₂) or inhalable particulate matter (PM); or 15 tpy of particulate matter with diameters of 10 microns or less (PM₁₀); or 10 tpy of particulate matter with diameters of 2.5 microns or less (PM_{2.5}); or 25 tpy of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen.

The Site's potential emission rates are as follows:

• CO:	10.17 T/yr
• NO _X :	5.08 T/yr
• PM/PM ₁₀ /PM _{2.5} :	0.00 T/yr
• SO ₂ :	1.15 T/yr
• VOC:	12.81 T/yr
• H ₂ S:	0.02 T/vr

As shown above, the Site will meet the requirements of this rule.

30 TAC §106.4(a)(2)

This rule requires a project that constitutes a new major stationary source or major modification under the new source review requirements of the Federal Clean Air Act (FCAA), Part D (Nonattainment), to obtain a permit in accordance with Chapter 116, Subchapter B of this title (relating to New Source Review Permits) and prohibits such a project from qualifying for PBR.

The Site is located in Live Oak County, which is classified as attainment; therefore, this rule does not apply.

30 TAC §106.4(a)(3)

This rule requires a project that constitutes a new major stationary source or major modification, as defined in 40 Code of Federal Regulations (CFR) §52.21, under the new source review requirements of the Federal Clean Air Act (FCAA), Part C (Prevention of Significant Deterioration [PSD]), to obtain a permit in accordance with Chapter 116, Subchapter B of this title (relating to New Source Review Permits) and prohibits such a project from qualifying for PBR.

The Site will not be a new major source as that term is defined in 40 CFR §52.21. Therefore, this rule does not apply.

30 TAC §106.4(a)(4)

This rule limits the total actual emissions from all PBR facilities at the site to 250 T/yr of CO or NO_X and 25 T/yr of VOC, SO₂, PM₁₀, or 25 T/yr of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen unless at least one facility at the account has been subject to public notification and comment as required in Chapter 116, Subchapter B or Subchapter D.

The potential emissions associated with the Site will be below these limitations. Therefore, the requirements of this rule will be met.

30 TAC §106.4(a)(5)

This rule requires that a Project comply with the version of the PBR that is effective on the date that construction commences.

This PBR registration document addresses the Site's compliance with the most recent versions of 30 TAC §106.4, §106.352, and §106.492. If another version of any of these PBR sections becomes effective before the commencement of construction on the Project, the Site will comply with that version of the PBR section(s).

30 TAC §106.4(a)(6)

This rule requires that a Project comply with all applicable provisions of the FCAA, §111 (New Source Performance Standards [NSPS]) and §112 (Hazardous Air Pollutants [HAPs]), and the new source review requirements of the FCAA, Part C and Part D and regulations promulgated there under.

As stated previously, the Site will not be a major source and does not trigger Nonattainment or PSD permitting requirements.

30 TAC §106.4(a)(7)

This rule prohibits the use of a PBR when there is a permit condition precluding the use of the PBR.

The Site does not have an associated air permit prohibiting the use of a PBR. Therefore, this rule does not apply.

30 TAC §106.4(a)(8)

This rule contains requirements for facilities in the Houston/Galveston nonattainment area.

The Site will not be located in the Houston/Galveston nonattainment area; therefore, this rule does not apply.

30 TAC §106.4(b)

This rule prohibits circumventing the permitting requirements of Chapter 116 by artificial limitations.

The emission rates for the Site's sources are estimated based upon the anticipated maximum operating configuration. Therefore, Burlington Resources is not taking artificial limitations to avoid permitting under Chapter 116.

30 TAC §106.4(c)

This rule requires that the facility comply with all rules and regulations of the commission and with the intent of the TCAA, including protection of health and property of the public, and that all emissions control equipment shall be maintained in good condition and operated properly during operation of the facility.

The Site will be operated in compliance with the applicable state and federal air rules. Specifically, the requirements in 30 TAC §115 and §117.

30 TAC §106.4(d)

This rule requires that the Project be registered with or permitted by any local air pollution control agency with jurisdiction.

The Site is located in an area that does not have a local air regulatory agency. Therefore, this rule does not apply.

30 TAC §106.352, effective February 27, 2011

30 TAC §106.352(a)(1)

This rule requires that projects located in the Barnett Shale for which construction started on or after April 1, 2011 meet the requirements in subsections (a) – (k) of this rule. All other projects which started construction between February 27, 2011 and April 1, 2011, or sites not located in the Barnett Shale, are required to meet the requirements in subsection (l) of this rule.

The Site is not located in the Barnett Shale counties listed in this paragraph. Therefore, the Site will meet the requirements of this rule by meeting the requirements in subsection (l).

30 TAC §106.352(i)(1)

This rule states that prior to January 5, 2012, representations and registration of planned MSS is voluntary, but if represented must meet the applicable limits of this section. After January 5, 2012, all emissions from planned MSS activities and facilities must be considered for compliance with applicable limits of this section. This section may not be used at a site or for facilities authorized under §116.111 of this title if planned MSS has already been authorized under that permit.

Burlington Resources has voluntarily represented planned MSS emissions at this time, rather than the delayed compliance date in 2014, and will comply with the requirements of this rule.

30 TAC §106.352(i)(2)

This rule states that releases of air contaminants during, or as result of, planned MSS must be quantified and meet the emission limits in this section, as applicable. This analysis must include:

- (A) alternate operational scenarios or redirection of vent streams;
- (B) pigging, purging, and blowdowns;
- (C) temporary facilities if used for degassing or purging of tanks, vessels, or other facilities;
- (D) degassing or purging of tanks, vessels, or other facilities; and,
- (E) management of sludge from pits, ponds, sumps, and water conveyances.

This submittal includes emissions representations for alternate operational scenarios during maintenance events. The first scenario occurs when the well is shut in and not producing so that the flare on site may be taken down for maintenance. Emissions related to the standing losses of the liquids already in the storage tanks at the time of shut in are represented in this application as an MSS event. Working losses and flash emissions will not occur as the liquid levels would not be changing.

The second scenario occurs when engines located at sites downstream from this one go down for maintenance. This site would in turn send all low pressure gas from the separator to flare. The proposed site emissions include this maintenance event and the resulting combustion emissions.

All other MSS activities listed in this rule do not apply to the Site.

30 TAC §106.352(i)(3)

This rule states all planned MSS activities authorized by this section. These planned MSS activities require only recordkeeping of the activity.

Burlington Resources will keep records in accordance with this rule.

30 TAC §106.352(i)(4)

This rule states that engine and compressor startups associated with preventative system shutdown activities have the option to be authorized as part of typical operations if:

(A) prior to operation, alternative operating scenarios to divert gas or liquid streams are registered and certified with all supporting documentation;

(B) engine/compressor shutdowns shall result in no greater than 4 lb/hr of natural gas emissions; and

(C) emissions which result from the subsequent compressor startup activities are controlled to a minimum of 98% efficiency for VOC and H₂S.

This site does not include compressor engines. Therefore, this rule does not apply.

30 TAC §106.352(1)

This rule requires that the site handles gas containing less than two long tons per day of sulfur compounds.

The gas contains less than two long tons per day of sulfur and meets the requirements of this rule.

30 TAC §106.352(I)(1)

This rule requires that compressors and flares meet the requirements of §106.492 and §106.512.

This Site has one flare. As shown on later pages, this facility will meet the requirements listed in §106.492.

30 TAC §106.352(1)(2)

This requirement limits the total emissions from the sources authorized under this PBR, including process fugitives, combustion unit stacks, separator, or other process vents, tank vents, and loading emissions from all such facilities to 25 T/yr each of sulfur dioxide (SO₂), all other sulfur compounds, and VOC and 250 T/yr each of NO_X and CO. Emissions of VOC and sulfur compounds other than SO₂ must include gas lost by equilibrium flash as well as gas lost by conventional evaporation.

As stated previously, the emissions associated with this PBR registration are as follows:

• CO:	10.17 T/yr
• NO _x :	5.08 T/yr
• PM/PM ₁₀ /PM _{2.5} :	0.00 T/yr
• SO ₂ :	1.15 T/yr
• VOC:	12.81 T/yr
• H ₂ S:	0.02 T/yr

As shown above, the Site will meet the requirements of this rule.

30 TAC §106.352(l)(3)

This rule limits total emissions of sulfur compounds, excluding sulfur oxides, from all vents to 4.0 pounds per hour (lb/hr). This rule also contains stack height requirements for vents emitting sulfur compounds, excluding sulfur oxides.

The Site's total emissions of sulfur compounds will be less than 4.0 pounds per hour (lb/hr). Therefore, the requirement of this rule will be met.

30 TAC §106.352(l)(4)

This rule requires that a TCEQ Form PI-7 and associated documentation be submitted to the TCEQ before operation begins at a facility handling sour gas or a temporary facility.

The Site handles sour gas. A TCEQ form PI-7-CERT and associated documentation are being submitted to the TCEQ for registration before operation begins. Therefore, the requirements of this rule have been met.

30 TAC §106.492, effective September 4, 2000

30 TAC §106.492(1)(A)

This rule requires the flare shall be equipped with a flare tip designed to provide good mixing with air, flame stability, and a tip velocity less than 60 feet per second (ft/sec) for gases having a lower heating value less than 1,000 British thermal units per cubic foot (Btu/ft³) or a tip velocity less than 400 ft/sec for gases having a lower heating value greater than 1,000 Btu/ft³.

The flare tip will be designed to provide good mixing with air, flame stability, and will have a tip velocity of less than 400 ft/sec (maximum calculated velocity of 398.2 ft/sec). The waste gasses and fuel gasses will have a lower heating value greater than 1,000 Btu/ft³. Therefore, the maximum calculated velocity will meet the requirements of this rule.

30 TAC §106.492(1)(B)

This rule requires the flare shall be equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition and provides immediate notification of appropriate personnel when the ignition system ceases to function. A gas flare which emits no more than 4.0 pounds per hour (lb/hr) of reduced sulfur compounds, excluding sulfur oxides, is exempted from the immediate notification requirement, provided the emission point height meets the requirements of §106.352(4) of this title (relating to Oil and Gas Production Facilities).

The flare will be equipped with a continuously burning pilot light or other automatic ignition system that assures gas ignition and provides immediate notification when the system ceases to function. The flare will emit less than 4.0 pounds per hour (lb/hr) of reduced sulfur compounds, excluding sulfur oxides. Therefore, the requirements of this rule have been met.

30 TAC §106.492(1)(C)

This rule requires a flare which burns gases containing more than 24 parts per million by volume (ppmv) of sulfur, chlorine, or compounds containing either element shall be located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the flare or the owner of the property upon which the flare is located.

This flare burns gasses containing more than 24 parts per million by volume (ppmv) of sulfur, chlorine, or compounds containing either element, it is located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the flare or the owner of the property upon which the flare is located. Therefore, the requirements of this rule have been met.

30 TAC §106.492(1)(D)

This rule requires the heat release of a flare which emits sulfur dioxide (SO₂) or hydrogen chloride (HCl) shall be greater than or equal to the values identified in this rule.

The flare is not expected to emit hydrogen chloride. During the SMSS events, the heat release of the flare is 83.07 MMBtu/hr and the heat release predicted by the equation is 0.14363 MMBtu/hr. During normal operations the heat release of the flare is 6.94 MMBtu/hr and the heat release predicted by the equation is 0.001071 MMBtu/hr. Therefore, in both scenarios the heat release will be greater than the requirement identified in this rule and the requirements of this rule have been met.

30 TAC §106.492(2)(A)

This rule requires the flare to burn a combustible mixture of gases containing only carbon, hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements. When the gas stream to be burned has a net or lower heating value of more than 200 Btu/ft³ prior to the addition of air, it may be considered combustible.

The flare will burn a combustible mixture of gases containing only carbon, hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements. The heating value of the gas is estimated to be 1235 Btu/scf or higher, depending on the waste gas stream sent to flare at the moment. Therefore, the requirements of this rule have been met.

30 TAC §106.492(2)(B)

This rule requires a flare that burns gases containing more than 24 ppmv of sulfur, chlorine, or compounds containing either element shall be registered with the commission's Office of Permitting, Remediation, and Registration in Austin using Form PI-7 prior to construction of a new flare or prior to the use of an existing flare for the new service.

A form PI-7 CERT and supporting documentation is being submitted prior to construction in accordance with this rule. Therefore, the requirements of this rule have been met.

30 TAC §106.492(2)(C)

This rule requires that under no circumstances shall liquids be burned in the flare.

Liquids will not be burned with this flare. Therefore, the requirements of this rule have been met.



Texas Commission on Environmental Quality Permit by Rule Applicability Checklist Title 30 Texas Administrative Code § 106.4

Electronic Submittal - Only enter the PI-7 confirmation number here	if submitting electronically
Hard-Copy Submittal - Print and complete this checklist.	

The following checklist was developed by the Texas Commission on Environmental Quality (TCEQ), <u>Air Permits Division</u>, to assist applicants in determining whether or not a facility meets all of the applicable requirements. Before claiming a specific Permit by Rule (PBR), a facility must first meet all of the requirements of <u>Title 30 Texas Administrative Code § 106.4</u> (30 TAC § 106.4), "Requirements for Permitting by Rule." Only then can the applicant proceed with addressing requirements of the specific Permit by Rule being claimed.

The use of this checklist is not mandatory; however, it is the responsibility of each applicant to show how a facility being claimed under a PBR meets the general requirements of 30 TAC § 106.4 and also the specific requirements of the PBR being claimed. If all PBR requirements cannot be met, a facility will not be allowed to operate under the PBR and an application for a construction permit may be required under 30 TAC § 116.110(a).

Registration of a facility under a PBR can be performed by completing Form PI-7 (Registration for Permits by Rule) or Form PI-7-CERT (Certification and Registration for Permits by Rule). The appropriate checklist should accompany the registration form. Check the most appropriate answer and include any additional information in the spaces provided. If additional space is needed, please include an extra page and reference the question number. The PBR forms, tables, checklists and guidance documents are available from the TCEQ, Air Permits Division Web site at: www.tceq.state.tx.us/permitting/air/nav/air_pbr.html.

1. 30 TAC § 106.4(a)(1) & (4): Emission limits				
List emissions in tpy for each facility (add additional pages or table if needed): $SO_2 = $	See Table 3-1 for Individual Facilities			
 Are the SO₂, PM₁₀, VOC, or other air contaminant emissions claimed for each facility in this PBR submittal less than 25 tpy? Are the NO_x and CO emissions claimed for each facility in this PBR submittal less than 250 tpy? 	✓YES ☐NO			
If the answer to both is "Yes," continue to the question below. If the answer to either question is "No," a PBR cannot be claimed.				
Has any facility at the property had public notice and opportunity for comment under 30 TAC Section 116 for a regular permit or permit renewal? (This does not include public notice for voluntary emission reduction permits, grandfathered existing facility permits, or federal operating permits.) If "Yes," skip to Section 2. If "No," continue to the questions below.				
If the site has had no public notice, please answer the following: • Are the SO ₂ , PM ₁₀ , VOC, or other emissions claimed for all facilities in this PBR submittal less than 25 tpy? • Are the NO _x and CO emissions claimed for all facilities in this PBR submittal less than 250 tpy? If the answer to both questions is "Yes," continue to Section 2. If the answer to either question is "No," a PBR cannot be claimed. A permit will be required under Chapter 116.				
2. 30 TAC § 106.4(a)(2): Nonattainment check				
Are the facilities to be claimed under this PBR located in a designated ozone nonattainment county? If "Yes," please indicate which county by checking the appropriate box to the right. (Marginal) - Hardin, Jefferson, and Orange counties (BPA) (Moderate) - Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties (HGA) (Moderate) - Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties (DFW) If "Yes," to any of the above, continue to the next question. If "No," continue to Section 3.				

TCEQ - 10149 (Revised 11/05) 106.4 Checklist for Permits by Rule General Requirements This form for use by facilities subject to air quality permit requirements and may be revised periodically. (APDG 4999v6)

Does this project trigger a nonattainment review? To determine the answer, review the information below: • Is the project's potential to emit (PTE) for emissions of VOC or NO _x increasing by 100 tpy or more? **PTE is the maximum capacity of a stationary source to emit any air pollutant under its worst-case physical and operational design unless limited by a permit, rule, or made federally enforceable by a certification.	□YES □NO
• Is the site an existing major nonattainment site and are the emissions of VOC or NO _x increasing by 40 tpy or more?	□YES □NO
If needed, attach contemporaneous netting calculations per nonattainment guidance. Additional information can be found at:	
www.tceq.state.tx.us/permitting/air/forms/newsourcereview/tables/nsr_table8.html and www.tceq.state.tx.us/permitting/air/nav/air_docs_newsource.html	
If checklist is submitted as a hard copy, attach additional pages as needed. If checklist is submitted electronically, please email attachment to the following address: apd@tceq.state.tx.us	
If "Yes," to any of the above, the project is a major source or a major modification and a PBR may not be used . A Nonattainment Permit review must be completed to authorize this project. If "No," continue to Section 3.	
3. 30 TAC § 106.4(a)(3): Prevention of Significant Deterioration (PSD) check	
Does this project trigger a review under PSD rules? To determine the answer, review the information below: • Are emissions of any regulated criteria pollutant increasing by 100 tpy of any criteria pollutant at a named source? • Are emissions of any criteria pollutant increasing by 250 tpy of any criteria pollutant at an unnamed source? • Are emissions increasing above significance levels at an existing major site?	☐YES ☑NO ☐YES ☑NO ☐YES ☑NO
PSD information can be found at: <u>www.tccq.state.tx.us/permitting/air/forms/newsourcereview/tables/nsr_table9.html</u> and <u>www.tccq.state.tx.us/permitting/air/nav/air_docs_newsource.html</u>	
If "Yes," to any of the above, a PBR may not be used . A PSD Permit review must be completed to authorize the project. If "No," continue to Section 4.	
4. 30 TAC § 106.4(a)(6): Federal Requirements	
• Will all facilities under this PBR meet applicable requirements of Title 40 Code of Federal Regulations (40 CFR) Part 60, New Source Performance Standards (NSPS)? If "Yes," which Subparts are applicable?:	☐YES ☐NO ☑N/A
Will all facilities under this PBR meet applicable requirements of 40 CFR Part 63, Hazardous Air Pollutants Maximum Achievable Control Technology (MACT) standards? If "Yes," which Subparts are applicable?:	□YES □NO ☑N/A
 Will all facilities under this PBR meet applicable requirements of 40 CFR Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAPs)? If "Yes," which Subparts are applicable?: 	□YES □NO ☑N/A
If checklist is submitted as a hard copy, attach additional pages as needed. If checklist is submitted electronically, please email attachment to the following address: apd@tceq.statc.tx.us	
If "Yes" to any of the above, please attach a discussion of how the facilities will meet any applicable standards.	
5. 30 TAC § 106.4(a)(7): PBR prohibition check	
Are there any air permits at the site containing conditions which prohibit or restrict the use of PBRs?	□YES ☑NO
If "Yes," PBRs may not be used or their use must meet the restrictions of the permit. A new permit or permit amendment may be required. List permit number(s): N/A	
If "No," continue to Section 6.	

6. 30 TAC § 106.4(a)(8): NO _x Cap and Trade	
• Is the facility located in Harris, Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County? If "Yes," answer the question below. If "No," continue to Section 7.	□YES 🗹 NO
• Will the proposed facility or group of facilities obtain required allowances for NO _x if they are subject to 30 TAC Chapter 101, Subchapter H, Division 3 (relating to the Mass Emissions Cap and Trade Program)?	□YES □NO
7. Highly Reactive Volatile Organic Compounds (HRVOC) check	
 Is the facility located in Harris County? If "Yes," answer the next question. If "No," skip to the box below. Will the project be constructed after June 1, 2006? If "Yes," answer the next question. If "No," skip to the box below. Will one or more of the following HRVOC be emitted as a part of this project? 	☐YES ☑NO☐YES☐NO☐YES☐NO
If "Yes," complete the information below: 1,3-butadiene all isomers of butene (e.g., isobutene [2-methylpropene or isobutylene]) alpha-butylene (ethylcthylcne) beta-butylene (dimethylethylene, including both cis- and trans-isomers) ethylene propylene	
 Is the facility located in Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County? If "Yes," answer the next question. If "No," the checklist is complete. Will the project be constructed after June 1, 2006? If "Yes," answer the next question. If "No," the checklist is complete. Will one or more of the following HRVOC be emitted as a part of this project? 	☐YES ☑NO ☐YES ☐NO ☐YES ☐NO
If "Yes," complete the information below: lb/hr tpy ▶ ethylene	



Oil and Gas Handling and Production Facilities Title 30 Texas Administrative Code § 106.352(l)

Check the most appropriate answer and include any technical information in the spaces provided. If additional space is needed, please include an extra page that references this checklist. The forms, checklists, and guidance documents are available from the Texas Commission on Environmental Quality (TCEQ), Air Permits Division Web site at: www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil_and_gas.html. If you have any questions, or need additional assistance, please contact the Air Permits Division at (512) 239-1250.

The facility can register by submitting this application and any supporting documentation. Below is a checklist to ensure you have provided all appropriate documentation. For sites that require registration or if the company chooses to register the site with the TCEQ, a Core Data Form is required with this checklist.

I.	This checklist is for use by the operator to ensure a complete application.	
1.	Have you included each of the following items in the application?	
X	Process Description.	
X	Plot plan or area map.	
X	TCEQ Oil and Gas Emission Calculation Spreadsheet (or equivalent).	
×	Detailed summary of maximum emissions estimates with supporting documentation, such as resulting any emission estimation computer program.	lt reports from
×	Gas and Liquid analyses. If a site specific analysis is not submitted, please provide justification as representative site was used.	s to why a
X	Technical documents (manufacturer's specification sheet, operational design sheets)	
X	State and Federal applicability.	
X	Core Data Form (for new sites that have never been registered with the TCEQ).	
II.	General Information and Questions/Descriptions	
1.	Is the project located in one of the Barnett Shale counties and did the start of construction or modification begin on or after April 1, 2011?	☐ Yes 🗷 No
	Counties included in the Barnett Shale area: Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Stephens, Somervell, Tarrant, and Wise counties.	
	For what is considered start of construction see: www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/factsheet-const.pdf	
	If "Yes," do not complete this checklist. The project is subject to the requirements of §106.352(a)-(k). Additional information for Barnett Shale area projects can be found at: www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-o/oil_and_gas.html.	
2.	Are the total site-wide emissions from all facilities claimed under §106.352 less than 25 tpy VOC, 250 tpy NOx, 250 tpy CO, and 25 tpy SO ₂ ?	▼ Yes □ No

TCEQ – 10128 (Revised 01/12) 106.352(1) Registration Checklist This form is for use by facilities subject to air quality permit requirement and may be revised periodically. (APDG 5026v7)



Oil and Gas Handling and Production Facilities Title 30 Texas Administrative Code § 106.352(l)

II.	General Information and Questions/Descriptions (continued)		
3.	Does any facility at the site handle a stream with more than 24 ppm hydrogen sulfide (H ₂ S)? If "Yes," answer the following questions.	X Yes □	No
4.	Are there flares, engines, or turbines at the site?	Yes 🗌	No
	If "Yes," attach supporting documentation to demonstrate compliance with the requirements.		
	Additional information and checklists can be found at: §106.492 Flares:		
	www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-v/flares.html <i>§106.512 Stationary Engines and turbines:</i>		
	www.tceq.texas.gov/permitting/air/permitbyrule/subchapter-w/stationary_eng_turb.html		
5.	Does any facility at the site handle a stream with more than 24 ppm hydrogen sulfide (H ₂ S)?	🗶 Yes 🗌	No
	If "Yes," answer the following questions. Registration is required prior to the start of operation. If "No," skip questions 6 through 8.		
6.	Indicate the actual distance from the nearest emissions point to the nearest offsite receptor.	>4700	feet
	An offsite receptor includes any recreational area, residence, or other structure not occupied or used solely by the owner or operator of the facility. A facility handling sour gas must be located at least 1/4 mile from the nearest offsite receptor.		
7.	Indicate the total actual emission rate of sulfur compounds, excluding sulfur oxides, from all vents.	0.0608	lb/hr
8.	Does the height of all vents at the site emitting sulfur compounds meet the minimum required height based on the H ₂ S emission rate in 106.352(1)(4)?	>20	feet
	Note: Truck loading and fugitive sources are not considered vents.		

Recordkeeping: To demonstrate compliance with the requirements of the PBR, sufficient records must be maintained at all times. The records must be made available immediately upon request to the commission or any air pollution control program having jurisdiction. If you have any questions about the recordkeeping requirements, contact the Air Permits Division or the Air Program in the TCEQ Regional Office for the region in which the site is located.



Exemption §106.492 Checklist (Previously Standard Exemption 80)

Smokeless Gas Flares

YOU MUST SUBMIT A PI-7 WITH REQUIRED ATTACHMENTS BEFORE CONSTRUCTION OR OPERATION IF THE GAS BURNED IN THE FLARE HAS A SULFUR OR CHLORINE CONCENTRATION GREATER THAN 24 PPMV.

The following checklist is designed to help you confirm that you meet Exemption \$106.492, previously standard exemption 80, requirements. Any "no" answers indicate that the claim of exemption may not meet all requirements for the use of Exemption \$106.492, previously standard exemption 80. If you do not meet all the requirements, you may alter the project design/operation in such a way that all the requirements of the exemption are met, or obtain a construction permit.

YES	<u>NO</u>	<u>NA</u>	<u>DESCRIPTION</u>
✓	_		Have you included a description of how this exemption claim meets the general rule for the use of
1			exemptions (§106.4 checklist is available)?
<u>✓</u>	_	_	Is the flare equipped with a tip designed to provide good mixing with air, flame stability and a tip
			velocity less than 60 ft/sec for gases having a lower heating value less than 1,000 BTU/ft ³ , or less
			than 400 ft/sec for gases with a LHV greater than 1,000 BTU/ft ³ ? Attach a description including
/			BTU content and tip velocity (Table 8 is available).
✓_	_	_	Is the flare equipped with a continuously burning pilot or other automatic ignition system that assures
		1	gas ignition whenever vents are directed to the flare? Attach a description of the system.
	_	<u> </u>	If the flare emits more than 4 #/hr of reduced sulfur compounds, excluding sulfur oxides, is it
			equipped with an alarm system that immediately notifies appropriate personnel when the ignition
/			system ceases functioning? Attach a description of the system.
₹	_	_	If the flare emits less than 4 #/hr of reduced sulfur compounds and is not equipped with an alarm
			system, does the stack height meet the requirements of condition (d) of §106.352, previously standard
./			exemption STDX 66? Required height: 30. Actual height 30.
<u>Y</u>	_	_	If the flare burns gases containing more than 24 ppmv of sulfur, chlorine or compounds containing
			either element, is it located at least 1/4 mile from any recreational area, residence, or other structure
			not occupied or used solely by the owner or operator of the flare or owner of the property where the flare is located? Attach a scaled map.
		1	If the flare emits HCl, does the heat release (BTU/hr based on lower heating value) equal or exceed
_	_	<u>~</u>	2.73 x 10E5 x HCl emission rate(lb/hr)? Attach calculations.
1			If the flare emits SO2, does the heat release (BTU/hr based on lower heating value) equal or exceed
<u> </u>	_		0.53 x 10E5 x SO2 emission rate (lb/hr)? Attach calculations.
√			Will you limit the flare to burning only combustible mixtures of gases containing only carbon,
<u>-</u>	_	_	hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements?
1			Will the gas mixture always have a net or lower heating value of at least 200 BTU/ft3 prior to
	_	_	addition of air?
✓			Do you understand and will you ensure that liquids shall never be burned in the flare?
-	_	_	

ATTACHMENT 5 SUPPORTING DOCUMENTATION

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

30 TAC §106.4 Requirements for Permitting by Rule, effective May 15, 2011	5-1
30 TAC §106.352 Oil and Gas Production Facilities, effective February 27, 2011	5-4
30 TAC §106.492 Flares, effective September 4, 2000	5-8
Air Permit Technical Guidance for Chemical Sources: Flares and Vapor Oxidizers	
(June 1998): Table 4. Flare Factors	5-10
AP-42 Table 1.4-2: Emission Factors for Criteria Pollutants and Greenhouse Gases	
From Natural Gas Combustion	5-11
Air Permit Technical Guidance for Chemical Sources: Equipment Leak Fugitives	
(October 2000): Facility/Compound Specific Fugitive Emission Factors	5-12
TCEQ - Tank Truck Loading of Crude Oil or Condensate Guidance	5-15
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Figure 5-1 Representative H-S Meter Reading	5-31

\$\footnote{\text{SUBCHAPTER A: GENERAL REQUIREMENTS}} \\$\footnote{\text{S106.1, 106.2, 106.4, 106.6, 106.8, 106.13}} \quad \text{Effective May 15, 2011}

§106.1. Purpose.

This chapter identifies certain types of facilities or changes within facilities which the commission has determined will not make a significant contribution of air contaminants to the atmosphere pursuant to the Texas Health and Safety Code, the Texas Clean Air Act (TCAA), §382.057 and §382.05196.

Adopted August 9, 2000

Effective September 4, 2000

§106.2. Applicability.

This chapter applies to certain types of facilities or changes within facilities listed in this chapter where construction is commenced on or after the effective date of the relevant permit by rule.

Adopted August 9, 2000

Effective September 4, 2000

§106.4. Requirements for Permitting by Rule.

- (a) To qualify for a permit by rule, the following general requirements must be met.
- (1) Total actual emissions authorized under permit by rule from the facility shall not exceed 250 tons per year (tpy) of carbon monoxide (CO) or nitrogen oxides (NO_X); or 25 tpy of volatile organic compounds (VOC) or sulfur dioxide (SO₂) or inhalable particulate matter (PM); or 15 tpy of particulate matter with diameters of 10 microns or less (PM₁₀); or 10 tpy of particulate matter with diameters of 2.5 microns or less (PM_{2.5}); or 25 tpy of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen.
- (2) Any facility or group of facilities, which constitutes a new major stationary source, as defined in §116.12 of this title (relating to Nonattainment and Prevention of Significant Deterioration Review Definitions), or any modification which constitutes a major modification, as defined in §116.12 of this title, under the new source review requirements of the Federal Clean Air Act (FCAA), Part D (Nonattainment) as amended by the FCAA Amendments of 1990, and regulations promulgated thereunder, must meet the permitting requirements of Chapter 116, Subchapter B of this title (relating to New Source Review Permits) and cannot qualify for a permit by rule under

this chapter. Persons claiming a permit by rule under this chapter should see the requirements of §116.150 of this title (relating to New Major Source or Major Modification in Ozone Nonattainment Areas) to ensure that any applicable netting requirements have been satisfied.

- (3) Any facility or group of facilities, which constitutes a new major stationary source, as defined in 40 Code of Federal Regulations (CFR) §52.21, or any change which constitutes a major modification, as defined in 40 CFR §52.21, under the new source review requirements of the FCAA, Part C (Prevention of Significant Deterioration) as amended by the FCAA Amendments of 1990, and regulations promulgated thereunder, must meet the permitting requirements of Chapter 116, Subchapter B of this title and cannot qualify for a permit by rule under this chapter.
- (4) Unless at least one facility at an account has been subject to public notification and comment as required in Chapter 116, Subchapter B or Subchapter D of this title (relating to New Source Review Permits or Permit Renewals), total actual emissions from all facilities permitted by rule at an account shall not exceed 250 tpy of CO or NO_X; or 25 tpy of VOC or SO₂ or PM; or 15 tpy of PM₁₀; or 10 tpy of PM_{2.5}; or 25 tpy of any other air contaminant except carbon dioxide, water, nitrogen, methane, ethane, hydrogen, and oxygen.
- (5) Construction or modification of a facility commenced on or after the effective date of a revision of this section or the effective date of a revision to a specific permit by rule in this chapter must meet the revised requirements to qualify for a permit by rule.
- (6) A facility shall comply with all applicable provisions of the FCAA, §111 (Federal New Source Performance Standards) and §112 (Hazardous Air Pollutants), and the new source review requirements of the FCAA, Part C and Part D and regulations promulgated thereunder.
- (7) There are no permits under the same commission account number that contain a condition or conditions precluding the use of a permit by rule under this chapter.
- (8) The proposed facility or group of facilities shall obtain allowances for NO_X if they are subject to Chapter 101, Subchapter H, Division 3 of this title (relating to Mass Emissions Cap and Trade Program).
- (b) No person shall circumvent by artificial limitations the requirements of §116.110 of this title (relating to Applicability).

- (c) The emissions from the facility shall comply with all rules and regulations of the commission and with the intent of the Texas Clean Air Act (TCAA), including protection of health and property of the public, and all emissions control equipment shall be maintained in good condition and operated properly during operation of the facility.
- (d) Facilities permitted by rule under this chapter are not exempted from any permits or registrations required by local air pollution control agencies. Any such requirements must be in accordance with TCAA, §382.113 and any other applicable law.

Adopted April 20,2011

Effective May 15, 2011

§106.6. Registration of Emissions.

- (a) An owner or operator may certify and register the maximum emission rates from facilities permitted by rule under this chapter in order to establish federally-enforceable allowable emission rates which are below the emission limitations in §106.4 of this title (relating to Requirements for Permitting by Rule).
- (b) All representations with regard to construction plans, operating procedures, and maximum emission rates in any certified registration under this section become conditions upon which the facility permitted by rule shall be constructed and operated.
- (c) It shall be unlawful for any person to vary from such representation if the change will cause a change in the method of control of emissions, the character of the emissions, or will result in an increase in the discharge of the various emissions, unless the certified registration is first revised.
- (d) The certified registration must include documentation of the basis of emission estimates and a written statement by the registrant certifying that the maximum emission rates listed on the registration reflect the reasonably anticipated maximums for operation of the facility.
- (e) Certified registrations used to demonstrate that Chapter 122 of this title (relating to Federal Operating Permits) does not apply to a source shall be submitted on the required form to the executive director; to the appropriate commission regional office; and to all local air pollution control agencies having jurisdiction over the site.
- (1) Certified registrations established prior to the effective date of this rule shall be submitted on or before February 3, 2003.
- (2) Certified registrations established on or after the effective date of this rule shall be submitted no later than the date of operation.

SUBCHAPTER O: OIL AND GAS §§106.351 - 106.355 Effective February 27, 2011

§106.351. Salt Water Disposal (Petroleum).

Salt water disposal facilities used to handle aqueous liquid wastes from petroleum production operations and water injection facilities are permitted by rule, provided that the following conditions of this section are met.

- (1) Any facility processing salt water which emits a sour gas shall be located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the facility or the owner of the property upon which the facility is located.
- (2) Any open storage of salt water shall be operated in such a manner as to prevent the occurrence of a nuisance condition off-property.
- (3) All plant roads and truck loading and unloading areas must be operated and/or maintained as necessary to prevent dust emissions from the property which would cause or contribute to a nuisance condition. Appropriate operating activities may include reduction of speed of vehicles, use of alternate routes, and covering of dust-producing loads being hauled. Appropriate maintenance activities may include watering, treatment with dust suppressant chemicals, oiling, paving, and cleaning dust-producing surfaces.
- (4) Before construction of the facility begins under this section, registration of the permit by rule shall be submitted to the commission's Office of Permitting, Remediation, and Registration in Austin using Form PI-7, unless one of the following exceptions applies:
- (A) all delivery of salt water to the site takes place through enclosed hoses or lines, and all storage and handling of salt water takes place in enclosed conduits, vessels, and storage, so that the salt water is not exposed to the atmosphere; or
- (B) delivery of salt water from outside a site to all facilities at a site in any calendar day does not exceed 540,000 gallons.

Adopted August 9, 2000

Effective September 4, 2000

§106.352. Oil and Gas Handling and Production Facilities.

- (a) Applicability. This section applies to all stationary facilities, or groups of facilities, at a site which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids or gases found in geologic formations on or beneath the earth's surface including, but not limited to, crude oil, natural gas, condensate, and produced water with the following conditions:
- (1) The requirements in subsections (a) (k) of this section are applicable only for new projects and related facilities located in the Barnett Shale (Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Stephens, Somervell, Tarrant, and Wise Counties) on or after April 1, 2011. For all other new projects and related facilities in all other counties of the state, subsection (l) of this section is applicable.
- (2) Only one Oil and Gas Handling and Production Facilities permit by rule (PBR) for an oil and gas site (OGS) may be claimed or registered for each combination of dependent facilities and authorizes all facilities in sweet or sour service. This section may not be used if operationally dependent facilities are authorized by the Air Quality Standard Permit for Oil and Gas Sites, or a permit under §116.111 of this title (relating to General Application). Existing authorized facilities, or groups of facilities, at an OGS under this section which are not changing certified character or quantity of emissions must only meet subsections (i) and (k) of this section (protectiveness review and planned maintenance, startup, and shutdown (MSS) requirements) and otherwise retain their existing authorization. Except for planned MSS activities which must meet the requirements of subsection (i) of this section, any combination of dependent facilities with a permit under §116.111 of this title cannot also claim this section for any new facility, or changes to an existing facility, which handles (or is related to the processing of) crude oil, condensate, natural gas, or any other petroleum raw material, product, or by-product.
- (3) This section does not relieve the owner or operator from complying with any other applicable provision of the Texas Health and Safety Code, Texas Water Code, rules of the Texas Commission on Environmental Quality (TCEQ), or any additional local, state, or federal laws or regulations. Emissions that exceed the limits in this section are not authorized and are violations.
- (4) Emissions from upsets, emergencies, or malfunctions are not authorized by this section. This section does not regulate methane, ethane, or carbon dioxide.
 - (b) Definitions and Scope.

- (ii) Values in Tables 2 5F in subsection (m) of this section may be used with linear interpolation between height and distance points. A distance of less than 50 feet or greater than 5,500 feet may not be used. Release heights may not be extrapolated beyond the limits of any table and instead the minimum or maximum height will be used. If distances and release heights are not interpolated, the next lowest height and lesser distances shall be used for determination of maximum acceptable emissions. All facilities exempted from the distance to the property line restriction in subsection (e)(2) of this section must use 50 feet as the distance to the property line for those ambient standards based on property line.
- (B) Screening Modeling. A screening model may be used to demonstrate acceptable emissions from an OGS under this section if all of the parameters in the screening modeling protocol provided by the commission are met.
- (C) Dispersion Modeling. A refined dispersion model may be used to demonstrate acceptable emissions from an OGS under this section if all of the parameters in the refined dispersion modeling protocol provided by the commission are met.
- (l) The requirements in this subsection are applicable to new and modified facilities except those specified in subsection (a)(1) of this section. Any oil or gas production facility, carbon dioxide separation facility, or oil or gas pipeline facility consisting of one or more tanks, separators, dehydration units, free water knockouts, gunbarrels, heater treaters, natural gas liquids recovery units, or gas sweetening and other gas conditioning facilities, including sulfur recovery units at facilities conditioning produced gas containing less than two long tons per day of sulfur compounds as sulfur are permitted by rule, provided that the following conditions of this subsection are met. This subsection applies only to those facilities named which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids found in geologic formations beneath the earth's surface.
- (1) Compressors and flares shall meet the requirements of §106.492 and §106.512 of this title (relating to Flares; and Stationary Engines and Turbines, respectively). Oil and gas facilities which are authorized under historical standard exemptions and remain unchanged maintain that authorization and the remainder of this subsection does not apply.
- (2) Total emissions, including process fugitives, combustion unit stacks, separator, or other process vents, tank vents, and loading emissions from all such facilities constructed at a site under this subsection shall not exceed 25 tpy each of SO₂, all other sulfur compounds combined, or all VOCs combined; and 250 tpy each of NO_X and CO. Emissions of VOC and sulfur compounds other than SO₂ must include gas lost by equilibrium flash as well as gas lost by conventional evaporation.

- (3) Total emissions of sulfur compounds, excluding sulfur oxides, from all vents shall not exceed 4.0 pounds per hour (lb/hr) and the height of each vent emitting sulfur compounds shall meet the following requirements, except in no case shall the height be less than 20 feet, where the total emission rate as H_2S , lb/hr, and minimum vent height (feet), and other values may be interpolated:
 - (A) 0.27 lb/hr at 20 feet;
 - (B) 0.60 lb/hr at 30 feet;
 - (C) 1.94 lb/hr at 50 feet;
 - (D) 3.00 lb/hr at 60 feet; and
 - (E) 4.00 lb/hr at 68 feet.
- (4) Before operation begins, facilities handling sour gas shall be registered with the commission's Office of Permitting and Registration in Austin using Form PI-7 along with supporting documentation that all requirements of this subsection will be met. For facilities constructed under §106.353 of this title (relating to Temporary Oil and Gas Facilities), the registration is required before operation under this subsection can begin. If the facilities cannot meet this subsection, a permit under Chapter 116 of this title (relating to Control of Air Pollution by Permits for New Construction or Modification) is required prior to continuing operation of the facilities.
 - (m) The following tables shall be used as required in this section.

Figure: 30 TAC §106.352(m)

Table 1 Emission Impact Tables Limits and Descriptions

Topic	Description	Details	
Variables	E _{MAX} HOURLY	the maximum acceptable hourly (lb/hr) emissions for a specific air contaminant	
	EMAX ANNUAL	the maximum acceptable annual (tpy) emissions for a specific air contaminant	
	P	ambient air standard for a specific air contaminant $(\mu g/m^3)$	
	ESL	current published effects screening level for a specific air contaminant (µg/m³)	

(NSPS), Subpart CCCC, Standards of Performance for Commercial and Industrial Solid Waste Incineration Units, for Which Construction Is Commenced After November 30, 1999 or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001 (as published in the December 1, 2000 issue of the *Federal Register*); or 40 CFR Part 60, Subpart DDDD, Emission Guidelines and Compliance Times for Commercial and Industrial Solid Waste Incineration Units, that Commenced Construction On or Before November 30, 1999 (as published in the December 1, 2000 issue of the *Federal Register*). If determined to be applicable, commercial and industrial solid waste incinerators must demonstrate compliance with these federal regulations, including initial stack sampling, opacity readings, reporting, and recordkeeping.

- (C) State air regulations. Upon the request of the executive director, a designated representative of the commission, or a local air pollution control agency having jurisdiction over the site, compliance with §111.121 and §111.125 of this title (relating to Single-, Dual-, and Multiple-Chamber Incinerators; and Testing Requirements) must be demonstrated.
- (4) Monitoring. Incinerator operators/owners shall install, calibrate, maintain, and operate a monitoring device that continuously measures and records the temperature of the exhaust gas of the incinerator, in addition to any monitoring required by an appropriate NSPS subpart.
- (5) Recordkeeping. Records must be kept of the type and amount of waste charged/burned; type and amount of fuel usage, including sulfur content for fuel oil; monitoring and testing results; hours of operation; and routine maintenance of abatement systems sufficient to demonstrate each of the requirements listed previously are met. Such records must be retained for a minimum rolling two-year period and comply with §106.8 of this title (relating to Recordkeeping).

Adopted June 9, 2004

Effective June 30, 2004

§106.492. Flares.

Smokeless gas flares which meet the following conditions of this section are permitted by rule:

- (1) design requirements.
- (A) The flare shall be equipped with a flare tip designed to provide good mixing with air, flame stability, and a tip velocity less than 60 feet per second (ft/sec) for gases having a lower heating value less than 1,000 British thermal units per cubic foot (Btu/ft³) or a tip velocity less than 400 ft/sec for gases having a lower heating value greater than 1,000 Btu/ft³.
- (B) The flare shall be equipped with a continuously burning pilot or other automatic ignition system that assures gas ignition and provides immediate notification of appropriate personnel when the ignition system ceases to function. A gas flare which emits no more than 4.0 pounds per hour (lb/hr) of reduced sulfur compounds, excluding sulfur oxides, is exempted from the immediate notification requirement, provided the emission point height meets the requirements of §106.352(4) of this title (relating to Oil and Gas Production Facilities).

- (C) A flare which burns gases containing more than 24 parts per million by volume (ppmv) of sulfur, chlorine, or compounds containing either element shall be located at least 1/4 mile from any recreational area or residence or other structure not occupied or used solely by the owner or operator of the flare or the owner of the property upon which the flare is located.
- (D) The heat release of a flare which emits sulfur dioxide (SO₂) or hydrogen chloride (HCl) shall be greater than or equal to the following values:

For HCl $Q = 2.73 \times 10^5 \times HCl$

 $For SO_2 \qquad Q \qquad = \qquad 0.53 \times 10^5 \times SO_2$

Where Q = heat release, British thermal units per hour, based on lower heating value

HCl = HCl emission rate, lb/hr

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 SO_2 = SO_2 emission rate, lb/hr

- (2) operational conditions.
- (A) The flare shall burn a combustible mixture of gases containing only carbon, hydrogen, nitrogen, oxygen, sulfur, chlorine, or compounds derived from these elements. When the gas stream to be burned has a net or lower heating value of more than 200 Btu/ft³ prior to the addition of air, it may be considered combustible.
- (B) A flare which burns gases containing more than 24 ppmv of sulfur, chlorine, or compounds containing either element shall be registered with the commission's Office of Permitting, Remediation, and Registration in Austin using Form PI-7 prior to construction of a new flare or prior to the use of an existing flare for the new service.
 - (C) Under no circumstances shall liquids be burned in the flare.

Adopted August 9, 2000

Effective September 4, 2000

§106.494. Pathological Waste Incinerators.

- (a) Definitions. The following words and terms, when used in this section, shall have the following meanings, unless the context clearly indicates otherwise.
- (1) Pathological waste (as defined in 25 TAC §1.132 (relating to Definitions))-Includes, but is not limited to:

Flare Emission Factors

The usual flare destruction efficiencies and emission factors are provided in Table 4. The high-Btu waste streams referred to in the table have a heating value greater than 1,000 Btu/scf.

Flare Destruction Efficiencies

Claims for destruction efficiencies greater than those listed in Table 4 will be considered on a case-by-case basis. The applicant may make one of the three following demonstrations to justify the higher destruction efficiency: (1) general method, (2) 99.5 percent justification, or (3) flare stack sampling.

Table 4. Flare Factors

Waste Stream	Destruction/Removal Efficiency (DRE)		
VOC	98 percent (generic)		
	99 percent for compounds containing no more than 3 carbons that contain no elements other than carbon and hydrogen in addition to the following compounds: methanol, ethanol, propanol, ethylene oxide and propylene oxide		
H ₂ S	98 percent		
NH ₃	case by case		
СО	case by case		
Air Contaminants	Emission Factors		
thermal NO _x	steam-assist:	high Btu low Btu	0.0485 lb/MMBtu 0.068 lb/MMBtu
	other:	high Btu low Btu	0.138 lb/MMBtu 0.0641 lb/MMBtu
fuel NO _x	NO_x is 0.5 wt percent of inlet NH_3 , other fuels case by case		
СО	steam-assist:	high Btu low Btu	0.3503 lb/MMBtu 0.3465 lb/MMBtu
	other:	high Btu low Btu	0.2755 lb/MMBtu 0.5496 lb/MMBtu
РМ	none, required to be smokeless		
SO ₂	100 percent S in fuel to SO ₂		

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION^a

Pollutant	Emission Factor (lb/10 ⁶ scf)	Emission Factor Rating
CO ₂ ^b	120,000	A
Lead	0.0005	D
N ₂ O (Uncontrolled)	2.2	E
N ₂ O (Controlled-low-NO _X burner)	0.64	E
PM (Total) ^c	7.6	D
PM (Condensable) ^c	5.7	D
PM (Filterable) ^c	1.9	В
SO_2^d	0.6	A
TOC	11	В
Methane	2.3	В
VOC	5.5	С

a Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from lb/10⁶ scf to kg/10⁶ m³, multiply by 16. To convert from lb/10⁶ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

^b Based on approximately 100% conversion of fuel carbon to CO_2 . $CO_2[lb/10^6 \text{ scf}] = (3.67)$ (CON) (C)(D), where CON = fractional conversion of fuel carbon to CO_2 , C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2 \times 10^4 \text{ lb}/10^6 \text{ scf}$.

^c All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM₁₀, PM_{2.5} or PM₁ emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

d Based on 100% conversion of fuel sulfur to SO₂.

Assumes sulfur content is natural gas of 2,000 grains/10⁶ scf. The SO₂ emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO₂ emission factor by the ratio of the site-specific sulfur content (grains/10⁶ scf) to 2,000 grains/10⁶ scf.

Facility/Compound Specific Fugitive Emission Factors

	Ethylene	2	•	Petroleum	Oil and Ga	Oil and Gas Production Operations	Operation	5	9
Service	Oxide ¹	rnosgene -		Marketing Terminal	Gas	Heavy Oil <20° API	Light Oil >20°	Water/Li ght Oil	Kennery *
Valves					0.00992	0.0000185	0.0055	0.000216	
Gas/Vapor	0.000444	0.00000216	0.001105	0.0000287					650:0
Light Liquid	0.00055	0.00000199	0.00314	0.0000948					0.024
Heavy Liquid				0.0000948					0.00051
Pumps	0.042651	0.0000201	0.05634		0.00529	0.00113 10	0.02866	0.000052	
Light Liquid				0.00119					0.251
Heavy Liquid		:		0.00119					0.046
Flanges/Connectors	0.000555	0.00000011	0.000307		98000'0	0.00000086	0.000243	90000000	0.00055
Gas/Vapor				0.000092604					
Light Liquid				0.00001762					
Heavy Liquid				0.0000176					
Compressors	0.000767		0.000004		0.0194	0.0000683	0.0165	0.0309	1.399
Relief Valve	0.000165	0.0000162	0.02996		0.0194	0.0000683	0.0165	0.0309	0.35
Open-ended Lines 7	0.001078	0.00000007	0.00012		0.00441	0.000309	0.00309	0.00055	0.0051
Sampling	8800000		0.00012						0.033
Connectors					0.00044	0.0000165	0.000463	0.000243	
Other 9					0.0194	0.0000683	0.0165	0.0309	
Gas/Vapor				0.000265					
Light/Heavy Liquid				0.000287					
Process Drains					0.0194	0.0000683	0.0165	0.0309	0.07

Table Notes: All factors are in units of (lb/hr)/component.

- Monitoring must occur at a leak definition of 500 ppmv. No additional control credit can be applied to these factors. Emission factors are from EOIC Fugitive Emission Study, Summer 1988.
- 2. Monitoring must occur at a leak definition of 50 ppmv. No additional control credit can be applied to these factors. Emission factors are from Phosgene Panel Study, Summer 1988.
- 3. Monitoring must occur at a leak definition of 100 ppmv. No additional control credit can be applied to these factors. Emission factors are from Randall, J. L., et al., Radian Corporation. Fugitive Emissions from the 1,3-butadiene Production Industry: A Field Study. Final Report. Prepared for the 1,3-Butadiene Panel of the Chemical Manufacturers Association. April 1989.
- 4. Control credit is included in the factor; no additional control credit can be applied to these factors. Monthly AVO inspection required.
- 5. Factors give the total organic compound emission rate. Multiply by the weight percent of non-methane, non-ethane organics to get the VOC emission rate.
- 6. Factors are taken from EPA Document EPA-453/R-95-017, November 1995, Page 2-13.
- 7. The 28 Series quarterly LDAR programs require open-ended lines to equipped with a cap, blind flange, plug, or a second valve. If so equipped, open-ended lines may be given a 100% control credit.
- 8. Emission factor for Sampling Connections is in terms of pounds per hour per sample taken.

- 9. For Petroleum Marketing Terminals''Other'' includes any component excluding fittings, pumps, and valves. For Oil and Gas Production Operations, "Other'' includes diaphragms, dump arms, hatches, instruments, meters, polished rods, and vents.
- 10. No Heavy Oil Pump factor was derived during the API study. The factor is the SOCMI without C₂ Heavy Liquid Pump factor with a 93% reduction credit for the physical inspection.

Tank Truck Loading of Crude Oil or Condensate

Scope: Tank Truck Loading activities at loading terminals

The transportation and marketing of petroleum liquids involve many distinct operations, each of which represents a potential source of evaporation loss. Crude oil or condensate is transported from oil and gas sites to a refinery or other refining operations by tankers, barges, rail tank cars, tank trucks, and pipelines.

Loading losses are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations (for marine loading please review Marine Loading of Crude Oil and Condensate Guidance Document). Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are a composite of (1) vapors formed in the empty tank by evaporation of residual product from previous loads, (2) vapors transferred to the tank in vapor balance systems as product is being unloaded, and (3) vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations is, therefore, a function of the following parameters:

- Physical and chemical characteristics of the previous cargo;
- Method of unloading the previous cargo;
- Operations to transport the empty carrier to a loading terminal;
- Method of loading the new cargo; and
- Physical and chemical characteristics of the new cargo.

Tank truck loading operations can be divided into three general categories: A) atmospheric trucks, B) pressure trucks used in atmospheric service, and C) pressure trucks. The type of connection that is used in the loading procedure will be considered to determine the collection efficiency. "Quick connects" are clamp type connections that are not bolted or flanged. "Quick connects" can be used with atmospheric trucks. Hard-piped connections are bolted or flanged to the receiving vessel. Hard-piped connections should be used with pressure trucks to achieve its maximum collection efficiency. Atmospheric trucks must be leak checked according to NSPS Subpart XX to achieve its maximum collection efficiency.

Tank Truck Loading Authorizations

All stationary facilities, or groups of facilities, at a site which handle gases and liquids associated with the production, conditioning, processing, and pipeline transfer of fluids or gases found in geologic formations on or beneath the earth's surface including, but not limited to, crude oil, natural gas, condensate, and produced water that satisfy the general conditions of Title 30, Texas Administrative Code (30 TAC), Section 106.4, and the specific conditions of 30 TAC Section 106.352 are permitted by rule. The commission also has available rule language in an easy-to-read format for the permit by rule.

For all new projects and dependent facilities not located in the Barnett Shale counties, the current 106.352 subsection (1) is applicable, which contains the previous requirements of 106.352.

This form is for use by facilities subject to air quality permit requirements and may be revised periodically. Tank Truck Loading of Crude Oil or Condensate (Revised 02/12)

Page 1 of 4

For projects located in one of the Barnett Shale counties which are constructed or modified on or after April 1, 2011 subsections (a)-(k) apply.

Other permit by rules which may be used for tank truck loading but are not commonly seen are 106.261, 106.262, 106.472, and 106.473.

If a site does not qualify for a PBR, it may be authorized by a standard permit. Sites constructed prior to April 1, 2011 may be authorized using the Oil and Gas Standard Permit (30 TAC 116.620, effective January 11, 2000). For sites in one of the Barnett Shale counties constructed or modified on or after April 1, 2011, the site is subject to the requirements of the Air Quality Standard Permit for Oil and Gas Handling and Production Facilities.

Emission Calculations

Loading calculations are listed in AP-42, Chapter 5, Section 5.2: Transportation and Marketing of Petroleum Liquids.

Submerged tank truck loading is the minimum level of control required. The two types of submerge loading are the submerged fill pipe method and the bottom loading method. In the submerged fill pipe method, the fill pipe extends almost to the bottom of the cargo tank. In the bottom loading method, a permanent fill pipe is attached to the cargo tank bottom. During most of submerged loading by both methods, the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly during submerged loading, resulting in much lower vapor generation than encountered during splash loading.

The saturation factor, S, represents the expelled vapor's fractional approach to saturation, and it accounts for the variations observed in emission rates from the different unloading and loading methods. The loading calculation requires the use of a Saturation Factor (S factor) listed in Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses.

Submerged loading: dedicated normal service, S factor = 0.6

The S factor of 0.6 should be used if the tank truck is in "dedicated normal service". Dedicated normal service means the tank truck is used to transport only one product or products with similar characteristics (petroleum products with similar API gravity, molecular weight, vapor pressure).

Submerged Loading: dedicated vapor balance, S factor = 1.0

The S factor of 1.0 should be used if the loading vapors are returned back to the tank truck when it is unloaded to a storage tank or other vessel.

Emissions from loading petroleum liquid can be estimated using the following expression:

Where:

$$L_L = 12.46 \frac{SPM}{T}$$

- LL= loading loss, pounds per 1000 gallons (lb/103 gal) of liquid loaded
- S = a saturation factor (see Table 5.2-1)

This form is for use by facilities subject to air quality permit requirements and may be revised periodically. Tank Truck Loading of Crude Oil or Condensate (Revised 02/12)

Page 2 of 4

- P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
- M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
- T = temperature of bulk liquid loaded, R (F + 460)

Emissions are broken down into short-term emissions (lb/hr) and annual emissions (tons/year). Short-term emissions should be estimated by using the maximum expected vapor pressure and temperature of the compound being loaded and the maximum expected pumping rate being used to fill the container (loading tank truck). Annual emissions should be estimated by using the average annual temperature and corresponding vapor pressure of the compound and the expected annual throughput of the compound.

Capture/Collection techniques and efficiency

The overall reduction efficiency should account for the capture efficiency of the collection system as well as both the control efficiency and any downtime of the control device. Measures to reduce loading emissions include selection of alternate loading methods and application of vapor recovery equipment.

Please note, not all of the displaced vapors reach the control device, because of leakage from both the tank truck and collection system. The collection efficiency should be assumed to be 98.7 percent for tanker trucks passing an annual leak test per EPA standards. A collection efficiency of 70 percent should be assumed for trucks which are not leak tested.

- 70% capture/collection efficiency if not leak tested
- 98.7% capture/collection efficiency if leak tested based on EPA standards (NSPS Subpart XX)
- 100% capture/collection efficiency if a blower system is installed which will produce a vacuum in the tank truck during all loading operations. A pressure/vacuum gauge shall be installed on the suction side of the loading rack blower system adjacent to the truck being loaded to verify a vacuum in that vessel. Loading shall not occur unless there is a vacuum of at least 1.5 inch water column being maintained by the vacuum-assist vapor collection system when loading trucks. The vacuum shall be recorded every 15 minutes during loading.

Uncollected Loading Emissions

Uncollected loading emissions are referred to as loading fugitives and are listed as a separate emission point or source. Uncollected loading emissions (LLF) can be estimated using the following expression:

$$L_{LF} = (L_L) (1 - Collection Efficiency)$$

This form is for use by facilities subject to air quality permit requirements and may be revised periodically. Tank Truck Loading of Crude Oil or Condensate (Revised 02/12)

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Control techniques and control efficiencies

Emissions from controlled loading operations can be calculated by multiplying the uncontrolled emission rate calculated in the loading loss equation (LL) by an overall reduction efficiency term:

Emissions =
$$(L_L)$$
 (Collection Efficiency) $(1 - Collection Efficiency)$

- Flares Flares must meet 40 CFR 60.18 requirements of minimum heating value of waste gas and a maximum flare tip velocity. Flares can have a control efficiency of 98% or 99% for the following compounds: methanol, ethanol, propanol, ethylene oxide, and propylene oxide. The agency highly encourages the consideration of variable speed blowers when a control efficiency of > 98% is claimed for a steam assisted flare to reduce over steaming of the flare which could affect the control efficiency.
- Thermal oxidizers must be designed for the variability of the waste gas stream and basic monitoring which consists of thermocouple or infrared monitor that indicates the device is working. Control efficiencies range from 95% <99%.
- Carbon Systems Can claim up to a 98% control efficiency. The carbon system must have an alarm system that will prevent break through.
- Vapor Recovery Units (VRU) Can claim up to 100% control. Designed systems claiming 100% control must submit the requirements found in the Vapor Recovery Unit Capture/Control Guidance.

Note: Loading cannot occur while the control system is off-line.

Vapor balancing is NOT a form of control; it is only a capture technique.

SITE DATA

PERMIT BY RULE REGISTRATION

JO ANN ESSE UNIT F1

BURLINGTON RESOURCES OIL & GAS COMPANY LP

Representative Analyses: Etheridge B1 and Laird B1

Stream Compositions:

	Stre	am l	Stre	am 2	Stre	am 3	Stre	am 4
	Inlet	Gas	Flare As	ssist Gas	LP Con	densate	Produce	ed Water
Component	mole %	wgt. %	mole %	wgt. %	mole %	wgt. %	mole %	wgt %
Nitrogen	0.254%	0.301%	0.164%	0.202%	0.048%	0.012%	0.000%	0.000%
Carbon Dioxide	2.372%	4.420%	2.163%	4.185%	0.125%	0.049%	0.001%	0.002%
Water	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	99.000%	94.121%
Hydrogen Sulfide	0.0200%	0.029%	0.020%	0.030%	0.000%	0.000%	0.000%	0.000%
Methane	70.652%	47.988%	75.685%	53.374%	2.101%	0.302%	0.021%	0.018%
Ethane	14.029%	17.860%	11.765%	15.551%	2.081%	0.561%	0.021%	0.033%
Propane	6.979%	13.029%	4.689%	9.089%	3.619%	1.431%	0.036%	0.084%
I-Butane	1.061%	2.611%	0.899%	2.297%	1.260%	0.657%	0.013%	0.040%
N-Butane	2.235%	5.500%	1.663%	4.249%	3.992%	2.081%	0.040%	0.123%
I-Pentane	0.661%	2.019%	0.652%	2.068%	2.779%	1.798%	0.028%	0.107%
N-Pentane	0.665%	2.031%	0.623%	1.976%	3.830%	2.478%	0.038%	0.145%
Cyclopentane	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
n-Hexane	0.218%	0.795%	0.279%	1.057%	3.069%	2.372%	0.031%	0.141%
Cyclohexane	0.088%	0.321%	0.137%	0.519%	1.076%	0.831%	0.011%	0.050%
Other Hexanes	0.401%	1.463%	0.517%	1.958%	4.278%	3.306%	0.043%	0.196%
Heptanes	0.193%	0.819%	0.347%	1.528%	7.783%	6.993%	0.078%	0.412%
Octanes	0.044%	0.213%	0.109%	0.547%	6.618%	6.779%	0.066%	0.398%
Nonanes	0.025%	0.136%	0.058%	0.327%	5.967%	6.863%	0.060%	0.406%
Decanes Plus	0.007%	0.042%	0.014%	0.088%	46.045%	58.753%	0.460%	3.454%
Benzene	0.027%	0.089%	0.034%	0.117%	0.426%	0.298%	0.004%	0.016%
Toluene	0.062%	0.242%	0.132%	0.535%	1.824%	1.507%	0.018%	0.087%
Ethylbenzene	0.004%	0.018%	0.006%	0.028%	0.443%	0.422%	0.004%	0.022%
Xylene	0.023%	0.103%	0.065%	0.303%	2.634%	2.508%	0.026%	0.146%
Totals	100.02%	100.00%	100.02%	100.00%	99.998%	100.00%	99.999%	100.00%
Totals (C3+)		29.43%		26.69%		99.08%		5.83%
VOC max (%)		30.00%		30.00%		100.00%		10.00%
Higher Heating Value (Btu/scf)	1358		1315					
Lower Heating Value (Btu/scf)	1335		1292					
Specific Gravity	0.8185				0.7873			



Conoco Phillips

ID: Etheridge B1 LINE PRESSURE: 81 PSI AREA: Eagleford LINE TEMPERATURE: 84 F **METER: Low Pressure Separator** CYLINDER NUMBER: 0036

EFFECTIVE DATE: LEASE:

OPERATOR: SAMPLED BY: Robert Hester STATION: ANALYZED BY: Kerry Quave SAMPLE DATE: 12/20/2011 ANALYZED DATE: 12/24/2011 SAMPLE OF: Gas SAMPLE TYPE: Spot

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Physical Properties per GPA 2	145-09			Calculations per GPA 2286-03
Note: Zero = Less than detection limit		MOL%	WEIGHT%	GPM @ 14.696
NITROGEN CARBON DIOXIDE METHANE ETHANE PROPANE ISOBUTANE N-BUTANE ISOPENTANE N-PENTANE HEXANES HEPTANES PLUS		0.254 2.372 70.652 14.029 6.979 1.061 2.235 0.661 0.665 0.566 0.526	0.301 4.421 47.999 17.864 13.033 2.612 5.501 2.020 2.032 2.032 2.065 2.152	3.759 1.926 0.348 0.706 0.242 0.241 0.234 0.213
BTU @ 14.696 PSIA (DRY) BTU @ 14.696 PSIA (SAT.) Specific Gravity Compressibility (Z)	Vol. IDEAL Gas Fuel 1351.7 1328.1 0.8153 0.99	Vol. Real Gas Fuel 1357.6 1334.5 0.8185		
Gasoline Content (Gallons Per)	Thousand - GF	<u>PM)</u>	Secondary BTU Psia B	Base Vol. IDEAL Vol. Real

Gasoline Content (Gallons Per Thousand - GPM)		Secondary BTU Psia Base	Vol. IDEAL	Vol. Real	
			Gas Fuel	Gas Fuel	
Ethane & Heavier	7.456	BTU @ 15.025 PSIA (DRY)	1381.9	1388.1	
Propane & Heavier	3.697	BTU @ 15.025 PSIA (SAT.)	1357.8	1364.5	
Butane & Heavier	1.771				
Pentane & Heavier	0.717	Compressibility (Z) at 15.025 =	0.9956		
Total 26 psi Reid V.P. Gasoline GPM	1.391				

Remarks: Remarks:

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test, data to determine conformance with specifications. 5-20 created with polificatory Pro trial version www.pdffactory.com

SGS LABORATORY REFERENCE NUMBER: 6889-250891

COMPANY: Conoco Phillips AREA / FIELD: Eagleford

LEASE:

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.254	0.301	0.028
CARBON DIOXIDE	2.372	4.421	0.406
METHANE	70.652	47.999	11.999
ETHANE	14.029	17.864	3.759
PROPANE	6.979	13.033	1.926
ISOBUTANE	1.061	2.612	0.348
N-BUTANE	2.235	5.501	0.706
ISOPENTANE	0.661	2.020	0.242
N-PENTANE	0.665	2.032	0.241
2,2-Dimethylbutane	0.013	0.047	0.005
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.206	0.752	0.086
3-Methylpentane	0.129	0.470	0.053
n-Hexane	0.218	0.796	0.090
2,2-Dimethylpentane	0.004	0.017	0.002
Methylcyclopentane	0.053	0.189	0.019
2,4-Dimethylpentane	0.000	0.000	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.027	0.089	0.008
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.088	0.314	0.030
2-Methylhexane	0.008	0.034	0.004
2,3-Dimethylpentane	0.039	0.166	0.018
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.007	0.030	0.003
I,t-3-Dimethylcyclopentane	0.004	0.017	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.006	0.025	0.002
I,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.073	0.310	0.034
Methylcyclohexane	0.051	0.212	0.021
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.001	0.005	0.000
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.002	0.010	0.001
Ethylcyclopentane	0.001	0.004	0.000
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3.Dimethylhexane	0.000	0.000	0.000
Toluene	0.062	0.242	0.021
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.012	0.058	0.006
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.001	0.005	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SAMPLE DATE: #######



COMPANY: Conoco Phillips AREA / FIELD: Eagleford

LEASE:

	MOL%	WEIGHT%	GPM @ 14.696
1,c-3-Dimethylcyclohexane & 3-Ethylhexane	0.000	0.000	0.000
I,t-4-Dimethylcyclohexane & 1,c2,t3- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.008	0.038	0.004
n-Octane	0.024	0.116	0.012
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.002	0.010	0.001
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.001	0.005	0.000
Isopropylcyclopentane	0.001	0.005	0.000
Dimethylheptanes & Trimethylhexanes	0.003	0.016	0.002
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.002	0.011	0.001
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.004	0.018	0.002
Dimethylheptanes & Trimethylhexanes	0.002	0.011	0.001
m-Xylene & p-Xylene	0.007	0.031	0.003
2 & 4 Methyloctane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methyloctane	0.001	0.005	0.001
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.016	0.072	0.006
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.007	0.038	0.004
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.001	0.006	0.001
Isopropylbenzene & Trimethylcyclohexanes	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
Isopropylcyclohexane	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.001	0.005	0.000
N-Propylcyclohexane	0.001	0.005	0.001
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.001	0.006	0.001
n-Propylbenzene	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethyloctane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.002	0.012	0.001
	100.000	100.000	20.102

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test, data to determine conformance with specifications.

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SAMPLE DATE: #######

COMPANY: Conoco Phillips SAMPLE DATE: ########

AREA / FIELD: Eagleford

LEASE:

Calculated Value	Total Sample	Heptanes Plus
Molecular Weight	23.613	96.508
Relative Density	0.3730	0.7611
Liquid Density (lbs/gal Absolute Density)	3.110	6.345
Liquid Density (Ibs/gal Weight in Air)	3.107	6.339
Cu.Ft./Vapor / Gal. @ 14.696	49.981	24.949
Vapor Pressure @ 100° F	3660.220	0.980
API Gravity at 60° F	247.9	54.4
BTU / LB	21723	10231
BTU / GAL.	67539	60392
BTU / Cu. FT. (Vol. IDEAL Gas Fuel @ 14.696)	1351.7	5098.4
Specific Gravity as a Vapor @ 14.696	0.8153	1.6056

	Heavy End Grouping	Breakdown
HEXANES	C6	0.566
HEPTANES	C7	0.309
OCTANES	C8	0.162
NONANES	C9	0.046
DECANES+	C10	0.009
	Total	1.092 Mol%

BTEX BREA	KDOWN	
	Mol%	WT.%
BENZENE	0.027	0.089
TOLUENE	0.062	0.242
ETHYLBENZENE	0.004	0.018
XYLENES	0.023	0.103
Total BTEX	0.116	0.452

SGS LABORATORY REFERENCE NUMBER: 6889-250891

Conoco Phillips

ID: Etheridge B1
AREA: Eagleford

METER: Low Pressure Separator

LEASE: OPERATOR:

STATION: SAMPLE DATE: 12/20/2011

SAMPLE OF: Gas

LINE PRESSURE: 81 PSI LINE TEMPERATURE: 84 F CYLINDER NUMBER: 0036

EFFECTIVE DATE:

SAMPLED BY: Robert Hester ANALYZED BY: Kerry Quave ANALYZED DATE: 12/24/2011

SAMPLE TYPE: Spot

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Physical Properties per GPA 2145	-09		Calcu	ulations per GPA 2286-03
Note: Zero = Less than detection limit		MOL%	WEIGHT%	GPM @ 14.696
NITROGEN		0.254	0.301	
CARBON DIOXIDE		2.372	4.421	
METHANE		70.652	47.999	
ETHANE		14.029	17.864	3.759
PROPANE		6.979	13.033	1.926
ISOBUTANE		1.061	2.612	0.348
N-BUTANE		2.235 0.661	5.501	0.706
ISOPENTANE N-PENTANE		0.665	2.020 2.032	0.242 0.241
HEXANE		0.566	2.065	0.234
HEPTANE		0.309	1.191	0.122
OCTANE		0.162	0.690	0.066
NONANE		0.046	0.222	0.021
DECANE+		0.009	0.049	0.004
DEOXIVE!		0.003	0.043	0.004
		100.000	100.000	7.669
вти	Vol. IDEAL V	/ol. Real		
	Gas Fuel G	Gas Fuel		
BTU @ 14.696 PSIA (DRY)	1351.7	1357.6		
BTU @ 14.696 PSIA (SAT.)	1328.1	1334.5		
Specific Gravity	0.8153	0.8185		
Compressibility (Z)	0.9957			
Gasoline Content (Gallons Per Tho	usand - GPM	L)	Secondary BTU Psia Base	Vol. IDEAL Vol. Real
Ethane & Heavier Propane & Heavier Butane & Heavier		7.456 3.697 1.771	BTU @ 15.025 PSIA (DRY) BTU @ 15.025 PSIA (SAT.)	
Pentane & Heavier Total 26 psi Reid V.P. Gasoline GPN	Л	0.717 1.391	Compressibility (Z) at 15.02	5 = 0.9956

Remarks:

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SGS LABORATORY COMPANY: Conoco Phillips AREA / FIELD: Eagleford

Sample Container	Sample Description	Sample Point	Sample Time				
				Sample Matrix			
Cylinder Type/No.or Bottle	Field/Locations.Well		Date, heurs		RVP by D5191	Sample Pressue, psi	Sample Temp, F
		LP Separator before	12-20-2011 @				
Station 74139 (10)	Etheridge B1	Dump Valve	11:00 AM	Condensate	9.85 psi	84	85

	nic Extended Analy		
Component	<u>Mot%</u>	Liq Vol%	Wt%
Nitrogen	0.048	0.008	0.008
Carbon Dioxide	0.125	0.032	0.033
Methane	2.101	0.536	0.204
Ethane	2.081	0.838	0.379
Propane	3.619	1.501	0.967
Isobutane N-Butane	1.260	0.621	0.444
2,2 Dimethylpropane	3.992	1.895	1.406
IsoPertane	0.021	0.012	0.009
n-Pentane	2.779 3.809	1.530 2.079	1.215
2,2 Dimethylbutane	0.069	0.043	0.036
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.000	0.000
2 Methylpentane	1.842	1.151	0.153
3 Methylpentane	1.088	0.669	0.566
n-Hexane	3.069	1.900	1.603
Hectanes Plus	73.804	87.004	90.346
Total	100.000	100.000	100.000
			1
	Total Extended	Report	<u> </u>
Component	Mol%	Lia Vol%	Wt%
Nitrogen	0.048	0.008	0.006
Carbon Dioxide	0.125	0.032	0.033
Methane	2.101	0.536	0.204
Ethane	2.081	0.838	0.379
Propane	3.619	1.501	0.967
Isobutane	1.260	0.621	0.444
N-Butane	3.992	1.895	1.406
2,2 Dimethylpropane	0.021	0.012	0.009
IsoPentane	2.779	1.530	1.215
n-Pentane	3.809	2.079	1.666
2,2 Dimethylbutane	0.069	0.043	0.036
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.293	0.181	0.153
2 Methylpentane	1.842	1.151	0.962
3 Methylpentane	1.088	0.669	0.568
n-Hexane	3.069	1.900	1.603
Methylcyclopentane	0.986	0.526	0.503
8enzene	0.426	0.180	0.202
Cydohexame	1.076	0.551	0.549
2-Methylhexane	1.284	0.899	0.780
3-Methylhexane	1.053	0.728	0.640
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C-7's	0.801	0.541	0.482
n-Heptane	2.776	1.928	1.686
Methy cyclohexane	1.869	1.131	1.112
Toluene	1.824	0.920	1.018
Other C-8's	4.248	3.088	2.837
n-Octane	2.370	1.828	1.641
E-Benzene	0.443	0.258	0.285
M & P Xylenes	1.938	1.132	1.247
C-Xylene	0.696	0.398	0.448
Other C-9's	3.963	3.218	3.032
n-Nonane	2.004	1,698	1.557
Other C-10's	5.024	4.483	4.301
n Decane	1.515	1.400	1.306
Undecanes (11)	5.324	4.874	4.743
Dodecanes (12)	4.010	3.965	3.912
Tridecanes (13)	3./69	3.996	3.997
Tetradecanes (14)	3.226	3.663	3.714
Pentadecanes (15)	2.694	3.278	3.363
Hexadecanes (16)	2.180	2.835	2.934
Heptadecanes (17)	1.927	2.649	2.767
Octadecanes (18)	1.724	2.495	2 622
Nonadecanes (19)	1.600	2.413	2.551
Eicosanes (20)	1.271	1.992	2.118
Heneicosanes (21)	1.058	1,745	1.866
Docesanes (22)	0.967	1.662	1.788
Triccsanes (23)	0.757	1.349	1.459
Tetracosanes (24)	0.692	1.278	1.389
Pentacosanes (25)	0.617	1.182	1.290
Hexacosanes (26)	0.452	0.898	0.984
Heptacos anes (27)	0.493	1.015	1.118
Octacosanes (28)	0.424	0.903	0.998
Nonacosanes (29)	0.360	0.791	0.877
Triacontanes (30)	0.274	0.622	0.692
entriacontanes Plus (31+)	5.687	18.494	21.541
Total	100.000	100.000	100.000

Specific Gravity	0.8175	(Water = 1
API Gravity	41.59	@60 F
Molecular Weight	202.0	-
Vapor Volume	12.85	CF/Gal
Weight	6.81	Lbs/Gal

Characteristics of Tot	at samply	
Specific Gravity	0.7873	(Water = 1
API Gravity	48.24	@60 F
Molecular Weight	165.0	_
Vapor Volume	15.14	CF/Gal
Weight	6.56	Lbs/Gal



Conoco Phillips

ID: Laird B1 LINE PRESSURE: 1060 PSI AREA: Eagleford LINE TEMPERATURE: 112 F **METER: High Pressure Separator** CYLINDER NUMBER: 0110

LEASE: **EFFECTIVE DATE:** OPERATOR: SAMPLED BY: Robert Hester

STATION: ANALYZED BY: Kerry Quave SAMPLE DATE: 12/20/2011 ANALYZED DATE: 12/24/2011 SAMPLE OF: Gas SAMPLE TYPE: Spot

and jurisdiction issues defined therein

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Physical Properties per GPA 2145-09			C	alculations per GPA 2286-03
Note: Zero = Less than detection limit		MOL%	WEIGHT%	<u>GPM @ 14.696</u>
NITROGEN CARBON DIOXIDE METHANE ETHANE ETHANE PROPANE ISOBUTANE N-BUTANE ISOPENTANE N-PENTANE HEXANES HEPTANES PLUS		0.164 2.163 75.685 11.765 4.689 0.899 1.663 0.652 0.623 0.733 0.964	0.202 4.187 53.403 15.559 9.094 2.298 4.251 2.069 1.977 2.778 4.182	3.151 1.294 0.295 0.525 0.239 0.226 0.302 0.396 6.428
BTU @ 14.696 PSIA (DRY) BTU @ 14.696 PSIA (SAT.) Specific Gravity Compressibility (Z)	Vol. IDEAL Gas Fuel 1310.2 1287.3 0.7850 0.99	Vol. Real Gas Fuel 1315.3 1292.9 0.7878		
Gasoline Content (Gallons Per T	housand - GF	<u>РМ)</u>	Secondary BTU Psia Ba	
Ethane & Heavier Propane & Heavier Butane & Heavier		6.032 2.881 1.587	BTU @ 15.025 PSIA (DR BTU @ 15.025 PSIA (SA	T.) 1316.1 1321.9
Pentane & Heavier Total 26 psi Reid V.P. Gasoline G	BPM .	0.767 1.791	Compressibility (Z) at 15	.025 = 0.9960

Remarks: Remarks:

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SGS LABORATORY REFERENCE NUMBER: 6894-250891

COMPANY: Conoco Phillips AREA / FIELD: Eagleford LEASE:

	MOL%	WEIGHT%	GPM @ 14.696
NITROGEN	0.164	0.202	0.018
CARBON DIOXIDE	2.163	4.187	0.370
METHANE	75.685	53.403	12.848
ETHANE	11.765	15.559	3.151
PROPANE	4.689	9.094	1.294
ISOBUTANE	0.899	2.298	0.295
N-BUTANE	1.663	4.251	0.525
ISOPENTANE	0.652	2.069	0.239
N-PENTANE	0.623	1.977	0.226
2,2-Dimethylbutane	0.025	0.093	0.010
2,3-Dimethylbutane & Cyclopentane	0.000	0.000	0.000
2-Methylpentane	0.248	0.940	0.103
3-Methylpentane	0.182	0.688	0.074
n-Hexane	0.279	1.057	0.115
2,2-Dimethylpentane	0.009	0.040	0.004
Methylcyclopentane	0.062	0.229	0.022
2,4-Dimethylpentane	0.001	0.004	0.000
2,2,3- Trimethylbutane	0.000	0.000	0.000
Benzene	0.034	0.117	0.010
3,3-Dimethylpentane	0.000	0.000	0.000
Cyclohexane	0.137	0.507	0.047
2-Methylhexane	0.012	0.053	0.006
2,3-Dimethylpentane	0.071	0.313	0.032
1,1-Dimethylcyclopentane	0.000	0.000	0.000
3-Methylhexane	0.010	0.044	0.005
I,t-3-Dimethylcyclopentane	0.006	0.026	0.002
1,c-3-Dimethylcyclopentane & 3-Ethylpentane	0.009	0.039	0.004
I,t-2-Dimethylcyclopentane & 2,2,4- Trimethylpentane	0.000	0.000	0.000
n-Heptane	0.135	0.595	0.062
Methylcyclohexane	0.092	0.397	0.037
1,1,3- Trimethylcyclopentane & 2,2-Dimethylhexane	0.003	0.015	0.001
2,5-Dimethylhexane & 2,4-Dimethylhexane	0.005	0.025	0.003
Ethylcyclopentane	0.002	0.009	0.001
2,2,3- Trimethylpentane & 1,t-2,c-4- Trimethylcyclopentane	0.000	0.000	0.000
3,3-Dimethylhexane & 1,t-2,c-3- Trimethylcyclopentane	0.000	0.000	0.000
2,3,4- Trimethylpentane & 2,3.Dimethylhexane	0.000	0.000	0.000
Toluene	0.132	0.535	0.044
1,1,2- Trimethylcyclopentane	0.000	0.000	0.000
3,4-Dimethylhexane	0.000	0.000	0.000
2-Methylheptane	0.033	0.166	0.017
4-Methylheptane	0.000	0.000	0.000
1,c-2,t-4- Trimethylcyclopentane	0.000	0.000	0.000
3-Methylheptane & 3,4-Dimethylhexane	0.002	0.010	0.001

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications. ... 5-27 created with polfractory Pro trial version www.polffactory.com

SAMPLE DATE: #######



COMPANY: Conoco Phillips AREA / FIELD: Eagleford LEASE:

1,c-3-Dimethylcyclohexane & 3-Ethylhexane	MOL% 0.000	<u>WEIGHT%</u> 0.000	GPM @ 14.696 0.000
I,t-4-Dimethylcyclohexane & 1,c2,t3- Trimethylcyclopentane	0.000	0.000	0.000
2,2,5-Trimethylhexane & 1,1-Dimethylcyclohexane	0.000	0.000	0.000
Methyl-Ethylcyclopentane's & 2,2,4- Trimethylhexane	0.017	0.084	0.008
n-Octane	0.057	0.286	0.029
1,t2 Dimethylcyclohexane & 2,2,4,4- Tetramethylpentane	0.000	0.000	0.000
1,t-3-Dimethylcyclohexane & 1,c-4-Dimethylcyclohexane	0.004	0.020	0.002
Dimethylheptanes & 1 ,c-2,c-3- Trimethylcyclopentane	0.002	0.010	0.001
Isopropylcyclopentane	0.003	0.015	0.001
Dimethylheptanes & Trimethylhexanes	0.006	0.033	0.003
1,c-2-Dimethylcyclohexane	0.000	0.000	0.000
Dimethylheptanes	0.007	0.039	0.004
Ethylcyclohexane	0.000	0.000	0.000
n-Propylcyclopentane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
Ethylbenzene	0.006	0.028	0.002
Dimethylheptanes & Trimethylhexanes	0.002	0.011	0.001
m-Xylene & p-Xylene	0.019	0.089	0.007
2 & 4 Methyloctane & 3,4-Dimethylheptane	0.000	0.000	0.000
Trimethylcyclohexanes	0.000	0.000	0.000
3-Methyloctane	0.002	0.011	0.001
Trimethylcyclohexanes	0.000	0.000	0.000
o-Xylene	0.046	0.215	0.018
Trimethylcyclohexanes & Isobutylcyclopentane	0.000	0.000	0.000
n-Nonane	0.020	0.113	0.011
C9 Naphthenes & C10 Paraffins & Trimethylcyclohexanes	0.001	0.006	0.001
Isopropylbenzene & Trimethylcyclohexanes	0.001	0.005	0.000
C9 Naphthenes & C10 Paraffins	0.001	0.006	0.001
Isopropylcyclohexane	0.002	0.011	0.001
C9 Naphthenes & C10 Paraffins & Cyclooctane	0.002	0.010	0.001
N-Propylcyclohexane	0.001	0.006	0.001
C9 Naphthenes & C10 Paraffins & n-Butylcyclopentane	0.003	0.019	0.002
n-Propylbenzene	0.003	0.016	0.001
C9 Naphthenes & C10 Paraffins & EthylBenzenes	0.000	0.000	0.000
m-Ethyltoluene	0.000	0.000	0.000
p-Ethyltoluene	0.000	0.000	0.000
1,3,5- Trimethylbenzene & 4 & 5 Methylnonane	0.000	0.000	0.000
2-Methylnonane & 3-Ethyloctane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
O-Ethyltoluene & 3-Methylnonane	0.000	0.000	0.000
C9 Naphthenes & C10 Paraffins	0.000	0.000	0.000
tert-Butylbenzene	0.000	0.000	0.000
1,2,4 Trimethylbenzene & Methylcyclooctane	0.000	0.000	0.000
Isobutylcyclohexane & tert- Butylcyclohexane	0.000	0.000	0.000
n-Decane Plus	0.004	0.025	0.002
	100.000	100.000	19.664

Precision parameters apply in the determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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SAMPLE DATE: #######

LEASE:

Total Sample	Heptanes Plus
22.736	98.624
0.3670	0.7618
3.060	6.351
3.057	6.345
51.074	24.437
3889.010	1.010
254.1	54.2
21868	12034
66890	72131
1310.2	5205.2
0.7850	1.9341
	22.736 0.3670 3.060 3.057 51.074 3889.010 254.1 21868 66890 1310.2

Heavy End Grouping Breakdown				
HEXANES	C6	0.733		
HEPTANES	C7	0.486		
OCTANES	C8	0.343		
NONANES	C9	0.117		
DECANES+	C10	0.018		
	Total	1.697 Mol %		

BTEX BREAKDOWN			
	Mol%	WT.%	
B E NZENE	0.034	0.117	
TOLUENE	0.132	0.535	
ETHYLBENZENE	0.006	0.028	
XYLENES	0.065	0.304	
Total BTEX	0.237	0.984	

SGS LABORATORY REFERENCE NUMBER: 6894-250891

Conoco Phillips

ID: Laird B1 LINE PRESSURE: 1060 PSI AREA: Eagleford LINE TEMPERATURE: 112 F METER: High Pressure Separator CYLINDER NUMBER: 0110

LEASE: **EFFECTIVE DATE:**

OPERATOR: SAMPLED BY: Robert Hester STATION: ANALYZED BY: Kerry Quave SAMPLE DATE: 12/20/2011 ANALYZED DATE: 12/24/2011 SAMPLE OF: Gas SAMPLE TYPE: Spot

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Properties per	

Calculations per GPA 2286-03

Filysical Fluperties per GFA 2	110 00		Jaioaia	ions per GPA 2200-03
Note: Zero = Less than detection limit		MOL%	WEIGHT%	GPM @ 14.696
NITROGEN CARBON DIOXIDE METHANE		0.164 2.163 75.685	0.202 4.187 53.403	
ETHANE PROPANE		11.765 4.689	15.559 9.094	3.151 1.294
ISOBUTANE N-BUTANE ISOPENTANE		0.899 1.663 0.652	2.298 4.251 2.069	0.295 0.525 0.239
N-PENTANE HEXANE HEPTANE		0.623 0.733 0.486	1.977 2.778 1.967	0.226 0.302 0.194
OCTANE NONANE		0.343 0.117	1.527 0.584	0.194 0.141 0.051
DECANE+		0.018	0.104	0.010
	_	100.000	100.000	6.428
BTU @ 14.696 PSIA (DRY) BTU @ 14.696 PSIA (SAT.) Specific Gravity Compressibility (Z)		Vol. Real Gas Fuel 1315.3 1292.9 0.7878		
Gasoline Content (Gallons Per 1	Thousand - GPM	<u>l.)</u>	Secondary BTU Psia Base	Vol. IDEAL Vol. Real Gas Fuel Gas Fuel
Ethane & Heavier Propane & Heavier Butane & Heavier		6.032 2.881 1.587	BTU @ 15.025 PSIA (DRY) BTU @ 15.025 PSIA (SAT.)	1339.5 1344.8 1316.1 1321.9
Pentane & Heavier Total 26 psi Reid V.P. Gasoline G	GPM	0.767 1.791	Compressibility (Z) at 15.025	= 0.9960

Remarks:

Precision parametris determination of above test results. Also refer to ASTM D 3244-97/02, IP 367/96 and appendix E of IP standard methods for analysis and testing for utilization of test data to determine conformance with specifications.

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